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GF3

A GENERAL FORMATTING SYSTEM FOR GEO-REFERENCED DATA

VOLUME 3

STANDARD SUBSETS OF GF3

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CONTENTS

FOREWORD

The General Format 3 (GF3) system was developed by the IOC Committee on International Data and Information Exchange (IODE) as a generalized formatting system for the exchange and archival of data within the international oceanographic community. It was presented to the Ninth Session of the Technical Committee (New York, 15-19 January 1979) which recommended that GF3 be adopted for general use in international oceanographic data exchange and urged Member States to utilize GF3 as the standard international exchange format. This recommendation was subsequently endorsed by the IOC Executive Council at its Eleventh Session (Mexico City, 1-3 March 1979).

The GF3 format is supported by a comprehensive software package, GF3-Proc, that the IOC is prepared to make freely available to all organizations or laboratories involved in the international collection, management or exchange of oceanographic and other earth sciences data. Technical support for the distribution, installation and maintenance of GF3-Proc is provided, on behalf of the IOC, by the British Oceanographic Data Centre (BODC). Requests for copies of GF3-Proc should be forwarded to BODC at the address given and should include a clear description of the computer system on which it is to be installed, including the manufacturer, make and model number of the machine, the name and version of the operating system and an identification of the FORTRAN compiler. A small charge maybe made to cover the cost of reproduction and documentation.

Requests for technical advice and guidance on the use of GF3 and GF3-Proc should be addressed to:

British Oceanographic Data Centre
Proudman Oceanographic Laboratory
Bidston Observatory
Birkenhead, Merseyside, L43 7RA
UNITED KINGDOM

Support services explaining GF3 and its use are provided by the Service Hydrographique of the International Council for the Exploration of the Seas (ICES) acting as the Responsible National Oceanographic Data Centre for Formats. The ICES Service Hydrographique is assisted in the task by the British Oceanographic Data Centre. Inquiries concerning these services should be addressed to:

RNODC-Formats
International Council for the Exploration of the Seas
Service Hydrographique
Palaegade 2-4
DK 1261 Copenhagen K
DENMARK

The use and development of the GF3 system is kept under review by the IOC Group of Experts on Technical Aspects of Data Exchange (GETADE). Comments and suggestions for the improvement of GF3 may be forwarded to the Chairman of the Group either through the RNODC-Formats or through the IOC Secretariat.

The documentation for the GF3 system is published in IOC Manuals and Guides No 17 in 6 separate volumes under the title GF3 - A General Formatting System for Gee-referenced Data.

Volume 1: *"Introductory Guide to the GF3 Formatting System"* is intended to familiarize the new user with the purpose and scope of the GF3 system without overburdening him with the technical details. An introduction is provided, illustrated by examples, both to the GF3 format and to its supporting software package, GF3-Proc.

Volume 2: *"Technical Description of the GF3 Format and Code Tables"* contains a detailed technical specification of the GF3 format and its associated code tables.

Volume 3: *"Standard Subsets of the GF3 Format"* contains a description of standard subsets of the GF3 format tailored to a range of different types of data. It also serves as a set of examples illustrating how the GF3 format maybe used.

Volume 4: "User *Guide to the GF3-Proc Software"* provides an overview of GF3-Proc explaining what it does, how it works and how it is used. It also provides an introduction to the subroutine calls in the user interface to the package.

Volume 5: *"Reference Manual for the GF3-Proc Software"* contains a detailed specification of each GF3-Proc subroutine callable from the users programme and provides a detailed instruction on how and when these routines maybe used.

Volume 6: *"Quick Reference Sheets for GF3 and GF3-Proc"* contains quick and easy reference sheets to the GF3 format and the GF3-Proc software.

ACKNOWLEDGMENTS

The design and technical specifications of the GF3 format were prepared by Mr. M.T. Jones of the British Oceanographic Data Centre working in close collaboration with the IODE Group of Experts on Format Development (later GETADE) and with Mr. P. Winiarski of Germany. This document was assembled by the Chairman of the GETADE, Mr. R. Keeley (Canada).

INTRODUCTION

GF3 is a general purpose format system developed for the exchange of data within the international oceanographic community. It is a highly flexible, self-documenting system designed primarily for numerical data. It is not restricted to numerical data as the variety of structures available permit the inclusion of textual information in several ways.

The international collection and exchange of oceanographic data is often by type of data. For example, many countries collect and exchange CTD and drifting buoy data. To simplify this kind of exchange, the concept of standard subsets was introduced. A standard subset is a predefined format within the GF3 system for use as appropriate in the exchange of standard types of data.

A standard subset is constructed by predefining definition records which describe the contents of the tape and its detailed format. The user is thus spared the task of preparing the content for these header fields and can proceed directly with the necessary programming to create data types.

Another advantage of the standard subset is that it presents the user with a detailed format on which more complicated structures can be built. For example, if a format is required for a dataset which is quite similar to a standard subset except that more variables were observed, then it is relatively easy to add parameters to a standard subset, provided the hierarchical structure of the dataset is not altered.

STANDARD SUBSETS

The standard subsets included in this document have been prepared over the course of the development of GF3 and later use. They range from those handling geophysical observations, through classical oceanography and to time-series such as from wave recorders. There are 14 in all. As a set they illustrate the flexibility of GF3 to handle a wide variety of types of data, and also provide illustrations of how data may be exchanged using GF3. In addition, each subset description provides guidance on the sort of additional information about the collection that is useful in interpretation of the data.

Some of the formats illustrated here were developed for the exchange of data collected through the Integrated Global Ocean Services System (IGOSS). The formats used for the exchange of data in real-time are maintained by a committee of IGOSS. Over the years, these formats have changed and so the definition of the standard subset may not be identical to the current contents of these real-time codes. Nevertheless, the structure of the subsets will be suitable and extensions or modifications are easily made.

The concept of a standard subset was developed not to require that data of a type be exchanged in the form laid out by the subset. Rather a standard subset is a convenience to be used if appropriate. Users of GF3 need not feel bound to the exact form of the subsets shown here especially if they wish to include other variables not present in the definitions. These should be viewed as guidance material to be used exactly as shown if appropriate or with modification as needed to suit the data collection to be exchanged.

Electronic versions of all of these subsets are available from RNODC-Formats. They exist as postscript files in compressed form. Users may contact RNODC-Formats at the above mentioned address or through the World Wide Web at http://www.ices.inst.dk/

CLASSICAL HYDROCAST DATA

1. INTRODUCTION

1.1 The subset has been designed for the exchange of water bottle station data, e.g., Nansen casts, but may also be used for STD/CTD data at selected levels (e.g., inflexion points or standard depths) or rosette sampler data.

1.2 Due to the variety of parameters that maybe measured during a hydrocast station, a basic version of the subset is defined which is restricted to a simple depth/pressure series of temperature and salinity values. Guidelines are then given for extending this basic subset to include (a) meteorological data collected at the sea surface and (b) additional chemical determinations on the individual water samples.

2. CHARACTERISTICS OF THE SUBSET (BASIC VERSION)

2.1 The subset is formatted as a collection of multi-series data tiles arranged according to the record sequence shown in Section 3. Each series contains the depth-sequenced temperature and salinity values from a single hydrocast.

2.2 Identifiers for the hydrocast and details on its geographic latitude and longitude, and date/time of collection, are included in the 'fixed format' part of the series header record. Data from the hydrocast itself are stored in the 'user-formatted area' of the series header record according to the definition record given in Section 4. Data cycle records are not used in the basic version of this subset.

2.3 The first 80 bytes of the 'user formatted area' of the series header record are reserved for header parameters common to the hydrocast as a whole. There are 5 such parameters in the basic subset viz.: a parameter CAST to identify the type of hydrocast e.g., CTD, Nansen, STD or rosette; a parameter LVLS to indicate how the depth levels were selected e.g., observed (or observed + standard) levels for bottle data or information on the digitization criteria for CTD/STD data; 2 flag parameters QPOS and QTIM for quality control information on the values given for station position and start and end date/time; and a flag parameter SALD to indicate the convention used for measuring salinity. The remaining 71 bytes are left blank.

2.4 The remaining 1440 bytes of the series header record contain the depth sequenced data and allow for the storage of up to 35 data cycles of time, sea pressure, depth, temperature, salinity and their associated qualifier/quality control flags. Each data cycle fits into 40 bytes, i.e., 2 data cycles per 80 byte record. If the cast contains more than 36 depth levels, the data cycles maybe continued by repeating the series header record (duplicating its first 480 bytes, except bytes 383-386 and 397) using the flag in byte 397 to indicate the overflow.

2.5 Method codes are included in each data cycle for the depth, temperature and salinity values. This enables data collected by different methods to be included in the same series and avoids having to regenerate definition records when the method changes between series. The method code also enables data interpolated at standard depths to be clearly distinguished from values obtained by direct measurement.

2.6 A depth value is normally included in each data cycle but, as pressure is often the parameter that is actually measured, the subset also allows for the pressure values to be stored. The identification of which parameter is actually measured, rather than computed, can be implied from the method code entry for DEPH.

2.7 To accommodate practical salinity data in existing files, a number of data centres have included a one character flag field in their formats to indicate whether the salinity is stored as practical salinity or according to the pre-1978 definition of salinity. In line with this, and so as to avoid having to modify the definition record as the convention changes, the salinity values in each data cycle are stored in the undefined salinity parameter USAL, while the convention used is defined in the one character header parameter SALD.

2.8 Liberal use should be made of the optional plain language records following the tape header, tile header, or series header records to ensure that the data are adequately described, particularly with respect to quality control procedures and data quality.

2.9 Each data file will normally contain casts from one cruise, or platform, arranged in time sequence. However, depending on the application, data maybe grouped in files by other criteria, such as geographic region or time period, and ordered chronologically or geographically as appropriate. Comments on the grouping and ordering of the casts should be included in the plain language records at the beginning of the data set.

3. RECORD SEQUENCE (illustrated for hydrocasts arranged by cruise)

Test File	Test Records EOF		* optional records
Tape Header File	Tape Header Record * Plain Language Record(s) Series Header Definition Record EOF		
Data File 1	File Header Record * Plain Language Record(s) Series Header Record * Plain Language Record(s) Series Header Record * Plain Language Record(s) etc. EOF	 Cast 1 Cast 2 etc.	Cruise 1
Data File 2	File Header Record * Plain Language Record(s) Series Header Record * Plain Language Record(s) Series Header Record * Plain Language Record(s) etc. EOF	 Cast 1 Cast 2 etc.	Cruise 2
Data File N	File Header Record * Plain Language Record(s) Series Header Record * Plain Language Record(s) Series Header Record * Plain Language Record(s) etc. EOF	 Cast 1 Cast 2 etc.	Cruise N
Tape Terminator File	File Header Record (dummy entries) End of Tape Record EOF EOF		

4. SERIES HEADER DEFINITION RECORD FOR BASIS SUBSET

(insert hydro4)

5. ANNOTATED SAMPLE LISTING OF A SERIES HEADER RECORD CONTAINING A SINGLE NANSEN CAST STATION OF TEMPERATURE AND SALINITY DATA ONLY ('USER FORMATTED AREA' AS DEFINED IN SECTION 4)

(insert hydro5a)
(insert hydro5b)

6. PARAMETERS REFERENCED IN THE SUBSET

(Selected extract from the GF3 Parameter Code Table)

PPPP K MM S

CAST 7 AA N HYDROGRAPHIC CAST TYPE

Three character code used to identify different methods of data collection, coded as follows: -

BTH BATHY message
CTD CTD cast
DRB DRIBU drifting buoy message
MBT mechanical BT
OTH other method
ROS rosette sampler with CTD
STD STD cast
TSC TESAC message
UBT unspecified BT
WBR classical hydrographic station e.g., water bottles with reversing thermometers
XBT expendable BT
XXX unspecified or unknown

CNQF 7 AA N CHEMICAL CONTENT QUALIFIER FLAG

Used to qualify a recorded value of chemical concentration in cases where the only indication of the concentration is that it is 'less than' or 'greater than' the recorded value.

Once character flag set to:

'L' if the concentration is less than the recorded value
'G if the concentration is greater than the recorded value
'T' if trace indicated but no measurement attempted
- otherwise the character is blank filled

DEPH 7-- N SENSOR DEPTH BELOW SEA SURFACE (meters) downwards +ve

PR	Pressure measurement
RT	Reversing thermometer
ES	Echo sounding
WL	Wire length
FX	Fixed (e.g., attached to tower or ship hull)
ID	Standard depth for interpolated data
BT	Determined from fall rate
XX	Unspecified

FFFF 7 AA N QUALITY CONTROL FLAG

Quality control flag applicable to the value of the immediately preceding parameter in the 'user-formatted area'. It is coded as follows:

blank unspecified or quality control check has not been made

A Acceptable: data found acceptable during quality control checks

S Suspect Value: data considered suspect (but not replaced) by the data originator on the basis of either quality control checks or recorder/instrument/platform performance

Q Questionable Value: data considered suspect (but not replaced) during quality control checks by persons other than those responsible for its original collection e.g., a data centre

R Replaced Value: erroneous or missing data has been replaced by estimated or interpolated value - method by which replacement values have been derived should be described in plain language records

M Missing Value: original data erroneous or missing

HHMM 7 ZT N TIME WITHIN DAY lN FORMAT HHMM

where HH = hours and MM = minutes; both in GMT

LVLS 7 AA N SELECTION OF DEPTH LEVELS

Two character code to specify the method by which depth levels are sampled/digitized in a depth series; coded as follows: -

DI Data selected at constant depth intervals from continuous profile
IF Data selected at inflexion points from continuous profile
FX Data selected at predefine fixed levels, e.g., standard depths, from continuous profile
CB Data selected from continuous profile using combination of above criteria
OB Observed levels only (original measurements at discrete depths rather than in continuous profile)
ST Data interpolated to standard depth levels from observed levels
MX Observed levels plus depth interpolations to standard levels
XX Method unspecified

MMMM 7 FF N METHOD CODE IN USER FORMATTED AREA

This indicates that the method code MM appropriate to a specific stored parameter instead of being entered in bytes 8-9 of the Definition Record record defining that stored parameter, is entered in a ‘user-formatted area’ i.e., it is itself a header or data cycle parameter. In this subset it is coded as the first character only of the standard 2 character method code appropriate to the specified secondary parameter (DEPH, TEMP or USAL) - see above

PRES *7 XX* D SEA PRESSURE (decibars = 10^4 pascals, sea surface= 0)

QPOS *7* AA N QUALITY CONTROL FLAG FOR GEOGRAPHIC POSITION

One character quality control flag applicable to the latitude and longitude recorded for a given geographic location. For series at a fixed position it refers to the co-ordinates given in characters 270-284 of the series header record - coded as for FFFF below

QTIM 7 AA N QUALITY CONTROL FLAG FOR SERIES DATE/TIME

One character quality control flag applicable to start/end date/time entries given in bytes 242 to 269 of the series header record - coded as for FFFF below

SILT 7 AA N SALINITY UNITS FLAG

One character flag qualifying the salinity value stored in associated parameter USAL - coded as follows:

P = Practical Salinity
S = Salinity (pre 1978 definition) in parts/thousand

TEMP 7-- D	SEA TEMPERATURE (degrees Celsius)	
	RT	Reversing thermometer
	ST	STD/CTD sensor
	MT	Mechanical BT
	ET	Expendable BT
	BT	Unspecified BT
	ID	Value interpolated at standard depth
	XX	Unspecified

USAL 7-- D	UNDEFINED SALINITY (Practical Salinity or parts/thousand) (units definition is contained in associated parameter SALD)	
	BS	Bench salinometer
	PR	*In situ* conductivity probe
	TI	Titration
	SL	*In situ* salinity sensor
	ID	Value interpolated at standard depth
	XX	Unspecified

For the meteorological and chemical parameters referenced in the extended versions of the subset please refer to IOC Manuals and Guides No 17, Volume 2, Annex VII.

7. EXTENDING THE SUBSET

7.1 The basic subset may be easily extended, as required, to include other hydrocast measurements such as chemical determinations on the water samples and/or meteorological observations at the sea surface. Guidelines for extending the subset are given in the following paragraphs and through the worked examples in this section. The worked examples have been selected so as to provide compatibility with the content of the original formats developed for the exchange of water bottle data by the ICES Service Hydrographique and the US National Oceanographic Data Centre.

7.2 Hydrochemistry data

The subset can be extended to include hydrochemistry data by adding chemical parameters to the date cycles in the ‘user formatted area’ the series header record and by modifying the definition record accordingly. The NODC station data format includes fields for oxygen, phosphate, total phosphorus, silicate, nitrite, nitrate and pH data. The extension of the basic subset to accommodate these parameters maybe achieved by modifying the series header definition record as shown in Section 7.2.6. An annotated listing of a series header record formatted according to this definition is given in Section 7.2.7. The following points should be noted:

7,2.1 Due to the increased data cycle length, the maximum number of data cycles per record is reduced from 36 to 18.

7.2.2 So as to conform with the SI system of units, the chemical parameters are expressed in micromoles per cubic decimeter (for the parameters included in the extended subset this is numerically equivalent to microgram atoms per liter - oxygen determinations in milliliters/liter should be multiplied by 44.66).

7.2.3 If, at a given depth, a chemical determination is missing, its value is set according to the appropriate dummy value code.

7.2.4 A quality control flag, FFFF, is included with each of the chemical parameters.

7.2.5 The NODC and ICES formats include flags to indicate either trace amounts of chemical substances or amounts greater than or less than a specified value. To cater for these cases, each of the chemical parameters in the extended subset is accompanied by a one character qualifier flag CNQF (coded as in Section 5).

(insert hydro7.26a)
(insert hydro7.26b)
(insert hydro7.27)

7,3 Surface meteorology data

The subset can be extended to accommodate surface meteorological data by adding to the header parameters in the 'user formatted area' of the series header record. Ample space (71X) is available in the first 80 bytes of the 'user formatted area' for this purpose. A worked example of such an extended subset is provided by the series header definition records shown in Section 7.3.1 and by the annotated listing in Section 7.3.2 of a sample series header record formatted according to this extended definition. The extended subset includes secchi disc depth, water colour, wind speed and direction, dry and wet bulb air temperatures, barometric pressure, weather codes, cloud amount, cloud type, sea state, wave height, period and direction, and a one character flag field to indicate the presence of ice in the vicinity of the station. This selection of additional parameters covers all the meteorological observations commonly included in historical hydrocast data files. Thus, all the meteorology parameters in the ICES punched card system are included, as are virtually all of those in the NODC station data format. A further 25 bytes are available for the addition of further parameters if required. Missing values can, of course, be registered by inserting the appropriate dummy value. An alternative method for storing the meteorological data collected on a hydrographic cruise is to store them as a time-series in a separate data tile formatted.

(insert hydro7.3la)
(insert hydro7.3lb)
(insert hydro7.32)

7.4 If an extended subset is required covering both hydrochemistry and surface meteorology data, the extensions outlined in 7.2 and 7.3 can be easily combined. For example, to achieve a full simulation of the NODC station data format the series header definition records in Section 7.3.1 (i.e., the extended subset for surface met. data) should be modified as follows:

(a) a third record should be created containing in records 052 to 070, the contents of records 021 to 024 and 028 to 042 from the definition record given in Section 8, i.e., the additional hydro-chemistry parameters.

(b) in bytes 7 to 8 of record 001 the count of data cycle parameters should be increased from 12 to 31

(c) record 003 should be replaced by the format statement in record 002 of the definition record given in Section 7.2.6- this modifies the format of the individual data cycles to include the hydro-chemistry data.

7.5 A worked example showing how the basic subset may be extended to include both surface met. and hydrochemistry data is given by the series header definition record in Section 7.5.1. This example is, in fact, a GF3 version of the ICES Punched Card Format. It is similar to the subset outlined in 7.4 above but with the addition of extra data cycle parameters for ammonium, total nitrogen, hydrogen sulphide, total alkalinity and chlorophyll-A. Note, that in this example, the data cycle has overflowed onto a second 80 byte record, thus reducing the maximum number of data cycles that can be stored in a series header record from 18 to 9, if a neat 80 byte layout is to be maintained.

(insert hydro7.51a)
(insert hydro7.5lb)
(insert hydro7.5lc)
(insert hydro7.51d)

7.6 It will be noted that, in all the worked examples, the individual data cycles are stored in the 'user formatted area' of the series header record, and that data cycles overflowing this area are continued by repeating the series header record (see 7.4). An alternative solution would be to store the data cycles in data cycle records (following the series header record) leaving only the header parameters in the series header record - in this case the data cycle parameters should be described through data cycle definition records.

7.7 If the format of the series header record is modified, and if this results in different formats applying to each data file, then the appropriate definition records should be inserted at the head of each data file following the file header record (and any plain language records if present) rather than in the tape header file as shown in Section 3.

CTD DATA

1. INTRODUCTION

This subset is designed for data collected by a CTD or similar profiling instrument, lowered from a single location and sampling temperature, conductivity and perhaps other variables.

2. CHARACTERISTICS OF THE SUBSET

2.1 This subset is formatted as a collection of multi-series data files, with each data file comprising a consistent set of CTD series, e.g., from a specific cruise, or a specific geographic area. The data are organized as illustrated in Section 3.

2.2 The user formatted area of the series header record contains the Nansen cast/multi-sampler data used for the calibration of the CTD. Corresponding values from the CTD cast are also included for comparison. The method field in the parameter code distinguishes between data collected by the CTD sensors and those measured by reversing thermometer or bench salinometer. The format is defined by the definition record given in Section 4.1.

2.3 In the data cycle records each data cycle has sea pressure, temperature and practical salinity, together with quality control flags. Blank characters in the format specification permit a neat 80 column layout. The format is defined by the definition record given in Section 4.2.

2.4 Liberal use should be made of the plain language records following the file header or series header records, as appropriate, so as to ensure that the data are adequately described and documented.

2.5 The GF3 parameter codes referenced in this subset are listed and described in Section 6. A full list of standard GF3 parameter codes may be found in IOC Manuals and Guides N“ 17- note that the structure of the parameter code allows the user to create his own code if a standard GF3 code is not available.

3. RECORD SEQUENCE

Test File	Test Records EOF		* optional records
Tape Header File	Tape Header Record * Plain Language Record(s) Series Header Definition Record Data Cycle Definition Record EOF		
Data File 1	File Header Record * Plain Language Record(s) Series Header Record * Plain Language Record(s) Data Cycle Record(s) Series Header Record * Plain Language Record(s) Data Cycle Record(s) etc. EOF	 CTD Cast 1 CTD Cast 2	Cruise 1
Data File N	File Header Record * Plain Language Record(s) Series Header Record * Plain Language Record(s) Data Cycle Record(s) Series Header Record * Plain Language Record(s) Data Cycle Record(s) etc. EOF	 CTD Cast 1 CTD Cast 2	Cruise N
Tape Terminator File	File Header Record (dummy entries) End of Tape Record EOF EOF		

4. DEFINITION RECORDS

4.1 DATA SERIES DEFINITION RECORD

(insert ctd4.1)

4.2 DATA CYCLE DEFINITION RECORD

(insert ctd4.2)

5. ANNOTATED LISTINGS

5.1 ANNOTATED LISTING OF SAMPLE SERIES HEADER RECORD FORMATTED ACCORDING TO THE DEFINITION GIVEN IN 4.1

(insert ctd5.1)

5.2 ANNOTATED LISTING OF SAMPLE DATA CYCLE RECORD FORMATTED ACCORDING TO THE DEFINITION GIVEN IN 4.2

(insert ctd5.2)

6. PARAMETER CODES REFERENCED IN THE SUBSET

PPPP K MM S

CNDC 7 XX D ELECTRICAL CONDUCTIVITY (mhos/meter)

DEPH 7-- N SENSOR DEPTH BELOW SEA SURFACE (meters, downwards +ve)

PR	Pressure measurements
RT	Reversing thermometer
ES	Echo sounding
WL	Wire length
FX	Fixed (e.g., attached to tower or ship hull)
ID	Standard depth for interpolated data
BT	Determined from fall rate
XX	Unspecified

DOXY 7-- D DISSOLVED OXYGEN (micromoles/cubic decimeter)

Micromoles of dissolved oxygen per cubic decimeter of water at 20¡C. (Note: to convert from measurements in milliliters per liter multiply by 44.66- the scaling factor in columns 49-56 of the definition record may be used to affect this conversion.

PR	*In situ* oxygen probe
TI	Titration
XX	Unspecified

FFFF 7 AA N QUALITY CONTROL FLAG

Quality control flag applicable to the value of the immediately preceding parameter in the 'user-defined area'. It is coded as follows:

Code Descriptor

blank Unspecified or quality control check has not been made

A Acceptable: data found acceptable during quality control checks

S Suspect Value: data considered suspect (but not replaced) by the data originator on the basis of either quality control checks or recorder/instrument/platform performance

Q Questionable Value: data considered suspect (but not replaced) during quality control checks by persons other than those responsible for its original collection e.g., a data centre

R Replaced Value: erroneous or missing data has been replaced by estimated or interpolated value - method by which replacement values have been derived should be described in plain language records

M Missing Value: original data erroneous or missing

PRES 7 --D SEA PRESSURE (decibars = 10^4 pascals): sea surface= 0

RT	Reversing thermometer
PR	*In situ* pressure probe
x x	Unspecified

PSAL 7-- D PRACTICAL SALINITY

BS	Bench salinometer
PR	*In situ* conductivity probe
TI	Titration
SL	*In situ* salinity sensor
ID	Value interpolated at standard depth
x x	Unspecified

SVEL 7-- D SOUND VELOCITY (meters/second)

PR	*In situ* sound velocity probe
CV	Computed from other parameters (method of computation to be supplied in plain language records accompanying the data)
x x	Unspecified

TEMP 7-- D SEA TEMPERATURE (degrees Celsius)

RT	Reversing Thermometer
ST	STD/CTD sensor
MT	Mechanical BT
ET	Expendable BT
BT	Unspecified BT
ID	Value interpolated at standard depth
x x	Unspecified

7. USER OPTIONS

7.1 Additional parameters, such as oxygen (parameter code DOXY) or sound velocity (parameter code SVEL), may be appended to the CTD data cycles simply by adding to the end of the list of parameters in the data cycle definition record, and by modifying the format specification. So as to retain a neat 80 column layout, the number of data cycles per record should be reduced from 4 to 3- this would provide an additional 8 characters per data cycle (or an additional 22 characters per data cycle if the number of data cycles per record are reduced from 4 to 2).

For example, the addition of one parameter field expressed in 14 format, together with its associated one character quality control flag (making 2 extra parameters; plus 3X to make up the 8 characters) could be achieved by modifying the format specification in characters 98-157 of the data cycle definition record to read:

23(3(I5,A1,I5,A1,I5,A1,2X,I4,A1,3X),2X))

- note that with an odd number of data cycles per record, care must be taken to pad out with blanks (2X in this case) after the last data cycle of each record so as to maintain an ordered 80 column layout.

7.2 It is recognized that, on occasions, depth maybe available instead of pressure, or conductivity instead of practical salinity. For such cases, the user must revise the definition record accordingly using the parameter codes DEPH for depth or CNDC for electrical conductivity.

7.3 If calibration data are not available the user should set the number of data cycles to zero and leave the user formatted area of the series header record blank. If this applies to the whole tape, the series header definition record may be omitted.

7.4 If the user has modified the format as in 7.1 or 7.2, and if this results in different formats applying to each data file, then the appropriate data cycle definition record should be inserted at the head of each data file, following any plain language records that may be present, and not in the tape header file as shown in Section 3.

DIGITAL WAVE RECORDS

1. INTRODUCTION

1.1 This subset is designed for the exchange of wave records containing digital surface elevation data at or near their original sampling frequency (-1 Hz) - an individual ‘wave record’ being defined as a single uninterrupted burst of such sampling.

2. CHARACTERISTICS OF THE SUBSET

2.1 *The* data files are configured as multi-series files with each series containing a time-series of ‘wave records’ from a given location ordered in ascending sequence of time as illustrated in Section 3.

2.2 Each data cycle record (as defined in 4.1) contains a number of header parameters common to the ‘wave record’ as a whole, viz. date and time (GMT) of start of the record, duration of the record and the digital sampling frequency. These are followed by a maximum of 368 data cycles, ordered in ascending time sequence, each containing a single value of surface elevation relative to some arbitrary level which might be the mean of the ‘wave record’.

2.3 It should be noted that the time of each data cycle is not stored but is derived implicitly from the position of the data cycle in the ‘wave record’ and the interval between successive data cycles (i.e., the inverse of the digital sampling frequency). It is essential therefore, that any gaps in the ‘wave record’, such as might be caused by isolated spikes, should be padded with null values.

2.4 Each individual ‘wave record’ starts on a new data cycle record and the continuation of the ‘wave record’ onto succeeding data cycle records is controlled by use of the header parameter CCCC7AAN which is set as follows: -

0: ‘wave record’ completed within this data cycle record

1 : ‘wave record’ continues on next data cycle record

The header parameters in the second and succeeding data cycle records of the ‘wave record’ should be identical to those in the first, except for the overflow indicator which will be set to zero unless the ‘wave record’ overflows onto yet more data cycle records. Note that the number of surface elevation values in each data cycle record is contained in characters 3 to 6 of the data cycle record.

2.5 The format specification for the data cycle records has been chosen to permit a neat 80 column layout. Note that null values are not specified for the parameters YEAR, DATE, HHMM, FREQ and CCCC. These fields are mandatory for each data cycle record. In this subset, the user formatted area of the series header records has not been used and should be left blank.

2,6 Liberal use should be made of the plain language records following the file header or series header records, as appropriate, so as to ensure that the data are adequately described and documented,

3. RECORD SEQUENCE

Test File	Test Records EOF		* optional records
Tape Header File	Tape Header Record * Plain Language Record(s) Data Cycle Definition Record EOF		
Data File 1	Tape Header Record * Plain Language Record(s) Series Header Record * Plain Language Record(s) Data Cycle Record(s) Data Cycle Record(s) Series Header Record * Plain Language Record(s) Data Cycle Record(s) Data Cycle Record(s) EOF	 Wave record 1 Wave record 2 Wave record 1 Wave record 2	 Location 1 Location 2
Data File 2	File Header Record Series Header Record * Plain Language Record(s) Data Cycle Record(s) EOF		
Tape Terminator File	File Header Record (dummy entries) End of Tape Record EOF EOF		

4. DEFINITION RECORDS

4.1 DATA CYCLE DEFINITION RECORD
(insert surf4. 1)

5. ANNOTATED LISTING OF SAMPLE DATA CYCLE RECORD FORMATTED ACCORDING TO THE DEFINITION GIVEN IN 4.1

(insert surf5)

6. PARAMETER CODES REFERENCED IN THE SUBSET

PPPP K MM S

CCCC 7-- N DATA CYCLE OVERFLOW INDICATOR

AA	One character code as follows: O = data cycles completed within this record 1 = data cycles continued on the next record

DATE 7 --N DATE WITHIN YEAR IN FORMAT MMDD

LE	Time of observation end (local time)
LS	Time of observation start (local time)
LT	Time of observation (local time)
ZE	Time of observation end (GMT)
ZS	Time of observation start (GMT)
ZT	Time of observation (GMT)

DRSC 7-- N DURATION (SECONDS)

PR	Duration of processed observation
SS	Duration of individual sample

FREQ 7 --N FREQUENCY (hertz)

PR	Frequency of processed observations
SS	Original sampling/digitization interval

HHMM 7 --N TIME WITHIN DAY IN FORMAT HHMM

LE	Time of observation end (local time)
LS	Time of observation start (local time)
LT	Time of observation (local time)
ZE	Time of observation end (GMT)
ZS	Time of observation start (GMT)
ZT	Time of observation (GMT)

VWSE 7-- D INSTANTANEOUS WATER SURFACE ELEVATION (meters)

X-	Unspecified method of calculation
F-	Fourier transform calculation
L-	Lag correlation calculation
C-	Simple computer analysis calculation
M-	Manual analysis of chart
E-	Visual estimation
-x	Unspecified sensor
-u	Unspecified instrumented sensor
-A	Accelerometer
-B	Ship borne wave record
-E	Inverted echo sounder
-L	Laser altimeter
-P	Bottom mounted pressure device
-R	Satellite altimeter
-s	Staff gauge
-v	Visual

VWTE 7-- D WATER SURFACE EAST-WEST TILT ANGLE (degrees)

X-	Unspecified method of calculation
F-	Fourier transform calculation
L-	Lag correlation calculation
C-	Simple computer analysis calculation
M-	Manual analysis of chart
E-	Visual estimation
-x	Unspecified sensor
-U	Unspecified instrumented sensor
-A	Accelerometer
-B	Ship borne wave record
-E	Inverted echo sounder
-L	Laser altimeter
-P	Bottom mounted pressure device
-R	Satellite altimeter
-s	Staff gauge
-v	Visual

VWTN 7-- D WATER SURFACE NORTH-SOUTH TILT ANGLE (degrees)

X-	Unspecified method of calculation
F-	Fourier transform calculation
L-	Lag correlation calculation
C-	Simple computer analysis calculation
M-	Manual analysis of chart
E-	Visual estimation
-X	Unspecified sensor
-U	Unspecified instrumented sensor
-A	Accelerometer
-B	Ship borne wave record
-E	Inverted echo sounder
-L	Laser altimeter
-P	Bottom mounted pressure device
-R	Satellite altimeter
-S	Staff gauge
-V	Visual

YEAR 7 --N CALENDAR YEAR

LE	Time of observation end (local time)
LS	Time of observation start (local time)
LT	Time of observation (local time)
ZE	Time of observation end (GMT)
ZS	Time of observation start (GMT)
ZT	Time of observation (GMT)

7. USER OPTIONS

7.1 The grouping of data series into files is at the user's discretion. For example, he may wish to store only related data in the same file or alternatively group all his data in one single file.

7.2 Additional parameters may be appended to the data cycles simply by adding to the end of the list of parameters in the data cycle definition record and by modifying the FORTRAN format specification. Wherever possible, the

format specification should be chosen so as to retain a neat 80 column layout in the data cycle record with an integral number of data cycles per record.

For example, with a pitch/roll buoy, the user may wish to include surface slope values with the surface elevation data e.g., N-S and E-W tilt angles. Assuming these are each expressed as 14 fields, the modification can be achieved by adding North-South Tilt and East-West Tile parameters to the list of parameters and by replacing 368(15) in the format specification by 23(6(I5,I4,I4),2X)) i.e., allowing 138 discrete data cycles per data cycle record. See Section 4.2.

Alternatively, the user may wish to store, for example, heave acceleration instead of surface elevation. To do this, he should replace the entry defining the surface elevation parameter in the data cycle definition record by an appropriate specification for heave acceleration (parameter code VWSA 7 XX D). Care should be taken to modify the FORTRAN format specification in bytes 98- 157 if the field length is changed.

The subset may be extended to accommodate N-S and E-W surface tilt measurements by modifying records 001 and 002 of the data cycle definition record as follows:

(insert surf7.2)

7.3 If the user has modified the format as outlined in 7.2 and if this results in different formats applying to each data file, then the appropriate data cycle definition record should be inserted at the head of each data file following the plain language records, if any, and not in the tape header file as shown in 3.

DIGITIZED CONTOUR MAPS (MARINE GEOPHYSICAL DATA)

1. INTRODUCTION

1.1 Although designed originally for the exchange of digitized bathymetry contour maps, this subset is readily adaptable to a wide range of other contoured geophysical surfaces e.g., maps of total magnetic field, magnetic anomaly, observed gravity, free-air gravity anomaly, Bouger anomaly, etc. It also has applications outside the field of marine geophysics and may be adapted to virtually any digitized contour map expressed in the form of labeled contour streams of geographic latitude and longitude co-ordinates.

1.2 Within the subset individual contours are stored as a stream of paired geographic latitude and longitude co-ordinates. Each co-ordinate is stored in units of 0.001 degrees (North and East are positive). At a scale of 1 to 1 million this provides a contour resolution at the equator of the order of 0.1 millimeters.

1.3 In order to maintain the continuity of individual contours the following guidelines should be followed when digitizing contours:

(i) For closed contours the first pair of co-ordinate values in the contour stream should be the same as the last pair;

(ii) For contours truncated by, or starting at, a chart or grid boundary, the contour stream should include the co-ordinates of the contour at the boundary. (This applies to the contour streams at both sides of the boundary and ensures the continuity of the contour when plotted across the boundary);

(iii) Long contour streams maybe broken up into sections providing each section concludes with the same pair of co-ordinate values as the beginning of the following section.

2. CHARACTERISTICS OF THE SUBSET

2.1 The subset is described in terms of digitized contours of bathymetric depth in meters, corrected for the varying velocity of sound in sea-water (identified as the parameter BATH7CXN).

2.2 Individual contours are built up in 80 character contour segments - each segment constituting a GF3 data cycle. Each contour segment or data cycle is labeled by the value of the depth (BATH7CXN) appropriate to the contour and contains up to 5 pairs of latitude and longitude values. The actual number of co-ordinate pairs in the data cycle is stored in a count field (PAIR7XXN) within the data cycle. Also included in the data cycle is a one character flag field (CFLG7XXN) to indicate whether the data cycle or contour segment represents the start of a new contour. It is coded as follows:

1 : start of a new contour
2: continuation of a contour from the preceding data cycle

Note that a new data cycle is created at the start of each new contour.

2.3 The 80 character contour segments/data cycles are formatted and blocked into standard GF3 data cycle records according to the data cycle definition record given in 4.1. Each data cycle record is designed to carry up to 23 contour segments/data cycles; the actual number of data cycles stored being indicated in characters 6-8 at the beginning of the data cycle record.

Null values are not specified for the parameters BATH7CXN, PAIR7XXN and CFLG7XXN - valid entries are required in each data cycle for each of these parameters. However, null values of 999999 (dummy value code ’96’ = 6 nines) have been specified for the latitude and longitude fields to facilitate the removal of contour spikes, and, if necessary, for padding out the last data cycle at the end of an individual contour stream.

2.4 An annotated listing of a sample data cycle record formatted according to the data cycle definition record shown in 4.1 is given in Section 5, together with a demonstration plot of the actual data contained in the record. Note that in this example the last contour is in fact continued on the following data cycle record - the contour is left unclosed on the plot to illustrate this point.

2.5 The data cycle records are configured into series and files within the record organization shown in Section 3. The actual grouping of the contours into series and files is quite flexible, as illustrated by the following examples:

(i) Each file might represent a different map and each series a specific bathymetric contour level within that map e.g., File 1 = GEBCO Chart 5.04; Series 1 = 200m contours; Series 2 = 500m contours, etc;

(ii) Each file might represent a different bathymetric contour level and each series the contours for the level from a specific map e.g., File 1 = 200m contours; Series 1 = GEBCO Chart 5.04; Series 2 = GEBCO Chart 5.08; etc;

(iii) Each file might represent a different map and each series a different grid square(s) within that map - data cycles within each series might then be ordered in ascending sequence of contour level.

Other schemes may be considered. However, in order to assist the recipient, the arrangement of data into series and files should be clearly described in the plain language records of the tape header file, or following the file header record if all the data are contained in a single file. It should be noted that the fixed fields in the series header and file header records may be found useful for identifying the data contained in individual files or series.

2.6 The plain language records following the tape header, file header and series header records are optional but should be used, as appropriate, so as to ensure that the data contained on the tape are adequately described and documented.

2.7 The user formatted area of the series header record is not used in this subset and should be blank filled.

3. RECORD SEQUENCE

Test File	Test Records EOF	* optional records		
Tape Header File	Tape Header Record 8 Plain Language Record(s) Data Cycle Definition Record EOF			
Data File 1	File Header Record * Plain Language Record Series Header Record * Plain Language Record Data Cycle Record(s) Series Header Record * Plain Language Record Data Cycle Record(s) etc. EOF	Possible Map 1 Contour Level 1 etc.	data Contour Level 1 Map 1 etc.	arrangements Map 1 Grid Square 1 etc.
Data File N	File Header Record * Plain Language Record Series Header Record * Plain Language Record Data Cycle Record(s) Series Header Record * Plain Language Record Data Cycle Record(s) etc. EOF	Map N Contour Level 1 Contour Level 2 etc.	Contour Level N Map 1 Map 2 etc.	Map N Grid Square 1 Grid Square 2 etc.
Tape Terminator File	File Header Record (dummy entries) End of Tape Record EOF EOF			

4. DEFINITION RECORDS

4.1 DATA CYCLE DEFINITION RECORD

(insert map4. 1

4.2 ALTERNATIVE ENTRIES FOR RECORD 004

(insert map4.2

5. ANNOTATED LISTING OF SAMPLE DATA CYCLE RECORD FORMATTED ACCORDING TO THE DEFINITION GIVEN IN 4.1

(insert map5

6. PARAMETER CODES REFERENCED IN THIS SUBSET

PPPP K MM S

BATH 7 CX N BATHYMETRIC DEPTH (METERS)

Echo-sounding depth corrected for transducer depth. The first character of the method coded defines whether the depth has been corrected for the varying speed of sound in seawater viz.:

GBGA 7 XX N GRAVITY BOUGER ANOMALY (MILLIGALS)

GFAA 7-- N GRAVITY FREE-AIR ANOMALY (MILLIGALS)

Free-air Anomaly = Observed Gravity - Theoretical Gravity

The theoretical gravity formula used is identified by the first character of the method code viz.:

A- Heiskanen 1924

$$\gamma o = 978.052\ (1 + 0.005\ 285\ \sin 2\phi\_ \\ -0{,}0000070\ \sin^2 2\ \phi \\ +\ 0.000\ 027\ \cos^2\phi\ \cos^2(\lambda\_ - 18°))$$

B- International 1930

$$\gamma_o = 978.0490\ (1 + 0.005\ 2884\ \sin^2\phi\_ \\ -\ 0.000\ 0059\ \sin^2 2\phi)$$

C- IAG System 1967

$$\gamma_o = 978.03185\ (1 + 0.005\ 278895\ \sin^2\phi \\ +\ 0.000\ 023462\ \sin^4\phi)$$

Z- Other (described in documentation accompanying the data)

The reference system is specified in the second character of the method code viz.:

-A System IGSN 1971

-P Potsdam system

-L Local system (described in documentation accompanying the data)

-z Other system (described in documentation accompanying the data)

GRAV 7 XX N OBSERVED GRAVITY (MILLIGALS)

Observed gravity corrected for Eštvšs, drift, bias and tares

MAGR 7-- N MAGNETIC RESIDUAL FIELD (NANOTESLAS = gammas)

Residual Field = Total Field - Reference Field

The reference field is identified by the method code thus:

AA	IGRF 1965
AB	IGRF 1975
AC	IGRF 1980
DA	DGRF 1965
DB	DGRF 1970
DC	DGRF 1975
PA	PGRF 1975

(Additional reference fields identified in the MGD77 format may need to be added)

x x	Other reference field (described in documentation accompanying the data)

MAGT 7 XX N TOTAL MAGNETIC FIELD (NANOTESLAS = gammas)

7. USER OPTIONS

7.1 The actual parameter whose digitized contour surface is being stored is identified by the fourth record in the data cycle definition record. In the example in Section 5.1 it is the parameter BATH7CXN i.e., the bathymetric depth in corrected meters.

The subset may be readily adapted to other types of contour surface simply by modifying the parameter code in the fourth record in the data cycle definition record - thus enabling a different parameter to be included in the label field (i.e., the first 6 characters) of each contour segment/data cycle.

7.2 The fifth character in the parameter code specifies whether the parameter is an approved parameter already defined in the standard GF3 Parameter Code Table maintained by the Responsible National Oceanographic Data Centre for Formats in Copenhagen. If so, then it is set to '7'. However, if a standard parameter code is not available the user is encouraged to define his own, providing the fifth character of the code is set to '2' and only upper case alphabetic characters are used. In this circumstance the user is required to provide a full definition of the parameter, its code and units in the plain language records in the tape header file or at the beginning of the data file.

7.3 Examples of the use of the above parameters for storing different types of contoured surface are given in 4.2 viz.:

*(4.2a) Contours of corrected depth in fathoms - this example illustrates the use of the scaling factors in columns 49-64 of the definition record for the conversion of units. Although the contour label is stored in fathoms, the scaling factors enable it to be retrieved in SI units i.e., meters.

*(4.2b) Contours of uncorrected depth in meters with an assumed sound velocity of 1500m/sec - the sixth character ÔUÕ of the parameter code identifies the depth as being uncorrected for the varying velocity of sound, while the seventh character ÔAÕ identifies the assumed sound velocity as being 1500m/sec. These 2 characters constitute the method code - for an assumed sound velocity of 800 fms/sec they would be set to ÔUBÕ.

*(4.2c) Contours of total magnetic field in nanoteslas (gammas).

*(4.2d) Contours of residual magnetic field (relative to IGRF 1975) - the method code ÔABÕ in the sixth and seventh characters of the parameter code identifies the reference field as IGRF 1975- for IGRF 1965 they would be set to ÔAAÕ.

*(4.2e) Contours of observed gravity in milligals.

*(4.2f) Contours of free air gravity anomaly in milligals - note that the reference field is not specified in the method code (ÔXXÕ = unspecified) within the parameter code. In this case it would be describe in an appropriate plain language record.

*(4.2g) Contours of Bouger anomaly in milligals,

7.4 If only one type of contoured surface is contained on the tape, the data cycle definition record need only appear once on the tape i.e., in the tape header file as shown in 3. However, if different surfaces are mixed on the same tape (e.g., some files with bathymetric depth and others with maps of magnetic anomaly) then the appropriate data cycle definition records should be inserted immediately following the plain language records (if any) at the head of each data file. It is proposed that different types of contour surfaces should not be mixed within the same tile.

7.5 The standard subset as defined allows the latitude and longitude of contour points to be stored to a precision of 0.001 degrees. If a precision of 0.0001 degrees is required the subset maybe modified by changing the data cycle definition record as follows:

* on record 001 change bytes 7-8 from Ô13Õ to Ô11Õ

* on record 002 change 23(I6,1X,I1,1X,I1,1017)) to read 23 (I6,1X,I1,1X,I1,8I8,6X))

* on records 007 to 014 change byte 45 from Ô7Õ to Ô8Õ, byte 48 from Ô6Õ to Ô7Õ and bytes 51 to 56 from Ô 0.001Õ to Ô0.0001Õ

* on records 015 to 016 set all bytes as blanks except bytes 1 and 78-80

* note that with this modification each contour segment now contains up to 4 latitude/longitude pairs rather than 5.

DRIBU REPORTS (Drifting Buoy Observations)

1. INTRODUCTION

The subset has been designed for the archival, and dissemination in non-real time, of drifting buoy data reported using the World Meteorological Organization report form FM 14-VIII DRIBU (as described in Section 6). Additional fields are provided for quality control flags resulting from post-reporting checks on the data.

2. CHARACTERISTICS OF THE SUBSET

2.1 The data are organized into files according to the record sequence illustrated in Section 3. Each series contains the data from a single drifting buoy, arranged in time sequenced order. Each data file will normally contain only a single series.

2.2 Each series starts with a series header record which includes the buoy's identifier (as recorded in the DRIBU report), the date/time period covered by the series and, optionally, the geographic area and limits of geographic latitude and longitude within which the buoy has drifted. The 'user-defined area' of the series header record is not used and is blank filled.

2.3 The buoy data are stored in data cycle records. Each data cycle contains the data reported in a single DRIBU report and includes date, time, latitude, longitude, atmospheric pressure, pressure tendency, air and sea surface temperatures, wind speed and direction, and a sequence of subsurface depths (up to 999 meters only) and temperatures. Quality control flags may be stored with each of these measurements. The data cycles permit the inclusion of the elapsed time since the last reported position. This is important as the buoy positions reported in the DRIBU message are not always coincident with the data. The data cycles also include the speed and direction of the buoy's drift at its last reported position.

2.4 The data cycle records are formatted according to the 4 definition records shown in Section 4. Each data cycle record is designed to carry up to 11 data cycles, or DRIBU reports, with each data cycle comprising two 80 character records. The first record carries the date/time, position and meteorological data, while the second record caters for up to 10 subsurface depths and temperatures - if less than 10 depth levels are reported, the remaining levels are filled with dummy values. Note that the year of observation and depth of the buoy drogue are defined as header parameters and are included once only in each data cycle record.

2.5 Although the plain language records shown in Section 3 are optional, their use is strongly encouraged so as to ensure that the data are adequately described and documented. In particular, if it is known if and when the drogue separated from the buoy, this should be included in the plain language comments of the appropriate series.

3. RECORD SEQUENCE (with one series per data file)

Test File	Test Records EOF	* optional records
Tape Header File	Tape Header Record * Plain Language Record(s) Data Cycle Definition Record EOF	
Data File 1	File Header Record Series Header Record * Plain Language Record(s) Data Cycle Record(s) EOF	Drifting Buoy 1
Data File 2	File Header Record Series Header Record * Plain Language Record(s) Data Cycle Record(s) EOF	Drifting Buoy 2
Data File N	File Header Record Series Header Record * Plain Language Record(s) Data Cycle Record(s) EOF	Drifting Buoy N
Tape Terminator File	File Header Record (dummy entries) End of Tape Record EOF EOF	

4. DATA CYCLE DEFINITION RECORD

Four records are required as follows:

(insert 4.1)
(insert 4.2)
(insert 4.3)
(insert 4.4)

5. ILLUSTRATIVE EXAMPLES

5.1 SAMPLE DRIBU REPORT - The following is the first of a series of (illustrative) messages from buoy 46865.

$M_iM_iM_jM_j$	YYMMJ	GGggi	Q $L_aL_aL_a$	$L_aL_oL_oL_oL_o$			
ZZXX	22017	10520	75116	13959			
(lPPPP)	($2s_nT_wT_wT_w$)	(3ddff)	($4s_nTTT$)	(5appp)			
19892	20078	30912	40053	52002			
(888	$z_oz_oT_oT_oT_o$	$z_1z_1T_1T_1T_1$	$z_nz_nT_nT_nT_n$				
888	00078	05078	10076	20076	30074	50068	75052
999zz	$z_1z_1T_1T_1T$ .....$z_nz_nT_nT_nT_n$)						
99901	00042	50032					
61616	($1Q_pQ_2Q_{TW}Q_4$)	($2Q_NQ_L$//)	($H_LV_BV_Bd_Bd_B$)	(8 $V_iV_iV_iV_i$)			
61616		201//	60208				
($9i_dZ_dZ_dZ_d$)	69696		333	$A_1b_wn_bn_bn_b$			
91023	69696		333	46865			

5.2 SAMPLE GF3 SERIES HEADER RECORD (first 400 bytes only) for series of data from buoy 46865 compiled by the Marine Environmental Data Service, Ottawa. The last 1520 bytes of the record are not used and are blank filled.

(insert 5.2)

5.3 ANNOTATED LISTING OF SAMPLE DATA CYCLE RECORD FORMATTED ACCORDING TO THE DEFINITION GIVEN IN SECTION 4

(insert 5.3)

6. MAPPING DRIBU MESSAGE TO GF3

6.1 CODE FORM: WMO FM14-VIII DRIBU - REPORT OF DRIFTING BUOY OBSERVATIONS

Section 1	$M_iM_iM_jM_j$	YYMMJ	Ggggi	Q $L_aL_aL_a$	$L_aL_oL_oL_oL_o$
	(1PPPP)	($2s_nT_wT_wT_w$)	(3ddff)	($4s_nTTT$)	(5appp)
Section 2	(888	$z_0z_0T_0T_0T_0$	$z_1z_1T_1T_1T_1$	$z_nz_nT_nT_nT_n$)	
		999zz	$z_1z_1T_1T_1T_1$	$z_nz_nT_nT_nT_n$)	
		(00000)			
	61616	(1 $Q_PQ_2Q_{TW}Q_4$)	($2Q_NQ_L$//)	($H_LV_BV_Bd_Bd_B$)	($8V_iV_iV_iV_i$)
	($9i_dZ_dZ_dZ_d$)	69696			
Section 3	333	$A_1b_wn_bn_bn_b$			

Note i) Groups in brackets ( ) are optional - when they are not reported the corresponding GF3 parameter is set to its appropriate null value (as specified by the dummy value code in the definition record)

Note ii) The GF3 parameters QPOS7AAN, FFFF7AAN are not obtained from the DRIBU report but are quality control flags assigned during subsequent checking of the data.

DRIBU group	Explanation of DRIBU group (mapping of group into GF3)	GF3 parameter

$M_iM_iM_jM_j$ Report identifier = 'ZZXX' for DRIBU report (reference in plain language comment area indicating data supplied via a DRIBU report)

YYMMJ i) J indicates last digit of the year (expanded to 4 digits and transcribed into YEAR7ZTN

ii) YY is day of month, MM is the month, transcribed directly into . . DATE7ZTN

$GGggi_w$ i) GG is the hour of observation, gg is the minutes - both in GMT (transcribed directly as GGgg into HHMM7ZTN

ii) i_w - see group 3ddff

$Q_cL_aL_aL_aL_a$ Latitude in degrees and minutes in form DDMM with hemisphere indicated by Q_c (converted to degrees to 3 decimal places; north +ve, south -ve: and transcribed into . . . . . ., LATD7NSN

$L_oL_oL_oL_oL_c$ Longitude in degrees and minutes in form DDDMM with east/west indicated by Q_c of the latitude group (converted to degrees to 3 decimal places, expressed in the range O to 360 degrees East, and transcribed into LOND7NSN

1PPPP Atmospheric pressure in tenths of hecto-pascals with 1000 hectopascals digit omitted (if PPPP is less than 5000 then 1000 hecto-pascals are added; transcribed in 0.1 hecto-pascals into ATMS7XXA

$2s_nT_wT_wT_w$ Sea surface temperature $T_wT_wT_w$ in tenths of degrees Celsius; s_n gives the sign thus '0' if +ve and ' 1' if -ve (code S_n is changed to a sign and the signed value is transcribed in 0.1 deg C into SSTP7PRD

3ddff i) ff is the wind speed in knots if i_w (see above) is '3' or '4', or meters/see if i_w is '0' or ' 1' (converted to meters/sec if necessary and transcribed in 0.1 m/s into WSPD7XXA

ii) dd is the wind direction in tens of degrees from which the wind is blowing (transcribed directly in 10's of degrees in the range of O to 360 degrees (i.e., 0=north, 90=east, 180=south, 270=west) into WDIR7XXA

$4s_nTTT$ Air temperature TTT in tenths of degrees Celsius; s_n gives the sign thus '0' if +ve and ' 1' if -ve (code s_n is changed to a sign and the signed value is transcribed in 0.1 deg C into DRYT7XXA

5appp Atmospheric pressure change over 3 hours; the character a is '2' for rising pressure, '4' for no change (i.e., PPP = 000) and '7' for a falling pressure, while ppp gives the pressure change in tenths of hecto-pascals over 3 hours (character a is changed to a sign and the signed value is transcribed in 0.1 hecto-pascals/3 hours into the subset-conversion from hecto-pascals/3hrs to hecto-pascals/hr is done by the scaling factor of 0.033 built into the subset ATPT7XXA

$z_oz_oT_oT_oT_o$ Each group refers to a sub surface temperature measurement
$z_1z_1T_1T_1T_1$ with its associated depth.
.....
$z_nz_nT_nT_nT_n$ i) z_nz_n (and z_oz_o, z_1z_1 . . . ...) contains the last two (999zz) digits of the depth in meters. If the group is not preceded in the report by a 999zz group then the depth will be between O and 99 meters. When a 999zz group is included then zz* 100 meters should be added to the depth (z_nz_n) of all following

groups up to the next 999zz group when zz may be changed (depth Z_nz_n plus 100*zz as appropriate is transcribed in whole meters (up to 999 meters only) into DEPH7XXN

ii) $T_nT_nT_n$ (and $T_oT_oT_o$, $T_1T_1T_1$ . . . ...) is the sub surface temperature in tenths of degrees Celsius with negative temperatures indicated by adding 50 degrees to the absolute value e.g., -1.7 = 517 (if $T_nT_nT_n$ is greater than 500 then 500 is subtracted and the value made negative; transcribed in 0.1 degrees C into TEMP7PRD

(00000) Included only when the temperature at the greatest depth in the above series of values, is actually the bottom layer temperature i.e., the greatest depth is in fact the sea floor depth (not mapped into GF3)

1 $Q_pQ_2Q_{TW}Q_4$ One character quality flags indicating whether data are in range (P = pressure, 2 = 2nd word in message, TW = sea surface temperature and 4 = 4th word in message). (These flags are not mapped directly into GF3)

$2Q_NQ_L//$ i) Q_N is an indicator of transmission quality and is coded according to WMO Code Table 3313 (transcribed directly into GGST7XXN

ii) Q_L is an indicator of location quality and is" coded according to WMO Code Table 3311 (transcribed directly into GGLC7XXN

$H_LV_BV_Bd_Bd_B$ i) H_L is the nearest whole elapsed hour before GGgg (as stored in HHMM7ZTN in GF3) for which the latest known position of the buoy is given transcribed directly into ETHR7XXN

ii) V_BV_B is the drift speed in whole cm/sec of the buoy at its last known position (transcribed in whole cm/sec into SCSP7LGO

iii) d_Bd_B is the drift direction (i.e., direction to which buoy is drifting) in tens of degrees of the buoy at its last known position (transcribed in tens of degrees in the range O to 360 degrees (i.e., 0=north, 90=east, 180=south, 270=west into SCDT7LGD

$8V_iV_iV_iV_i$ Information on the engineering status of the buoy (not mapped directly into GF3 - salient information may be mapped into plain language comments if required).

$(9i_dZ_dZ_dZ_d)$ i) i_d is an indicator for type of drogue - not yet defined and not therefore mapped into GF3.

ii) $Z_dZ_dZ_d$ - drogue depth in whole meters (transcribed in whole meters into . . . DRDP7XXD

$A_1b_wn_bn_bn_b$ This group constitutes the buoy identifier where A_1b_w represents the WMO Region and sub area coded as in WMO Code Table 0161 and $n_bn_bn_b$ is the serial number. of the buoy within that Region/Sub area (transcribed directly into bytes 13-21 of record 002 of the GF3 series header record prefixed by the characters ‘BUOY’ and with byte 12 set to ‘5’.

6.2 GF3 PARAMETERS REFERENCED IN THIS SUBSET

PPPP K MM S

ATMS 7 XX A ATMOSPHERIC PRESSURE AT SEA-LEVEL (hecto-pascals = millibars).

ATPT 7 XX A ATMOSPHERIC PRESSURE TENDENCY (hecto-pascals/hour).
(rising +ve, falling -ve)

DATE 7 ZT N DATE WITHIN YEAR IN FORMAT MMDD
Where MM = calendar month and DD = day of month

DEPH 7 XX N SENSOR DEPTH BELOW SEA SURFACE (meters) downwards +ve

DRDP 7 XX D DEPTH OF DROGUE (meters)

DRYT 7 XX A AIR TEMPERATURE (degrees Celsius)

ETHR 7 XX N ELAPSED TIME (hours)

FFFF 7 AA N QUALITY CONTROL FLAG

Quality control flag applicable to the value of the immediately preceding parameter in the 'user-defined area'. It is coded as follows:
blank unspecified or quality control check has not been made

A Acceptable: data found acceptable during quality control checks

S Suspect Value: data considered suspect (but not replaced) by the data originator on the basis of either quality control checks or recorder/instrument/platform performance

Q Questionable Value: data considered suspect (but not replaced) during quality control checks by persons other than those responsible for its original collection e.g., a data centre

R Replaced Value: erroneous or missing data has been replaced by estimated or interpolated value - method by which replacement values have been derived should be described in plain language records

M Missing Value: original data erroneous or missing

GGST 7 XX N QUALITY OF THE BUOY SATELLITE TRANSMISSION -Q_N (WMO CODE 33 13)

One character code describing quality of satellite transmitted message. Coded as in WMO Code Table 3313 as follows:
O Good quality (several identical messages have been received)
1 Dubious quality (no identical messages)

GGLC 7 XX N QUALITY OF LOCATION -Q_L (WMO CODE 33 11)

One character code qualifying buoy position reported in satellite transmission message. Coded as in WMO Code Table 3311 as follows:
O The value transmitted at the beginning of the message is a reliable value (location made over two satellite passes)
1 The values at the beginning of the message are the latest known values (no location over the corresponding pass)
2 Dubious quality. The location was made over one pass only; a second solution is possible in 5% of the cases

HHMM 7 ZT N TIME WITHIN DAY IN FORMAT HHMM

Where HH = hours and MM = minutes
(The above 3 parameters relate to the date/time of measurements expressed in GMT)

LATD 7 NS N LATITUDE IN DEGREES (North +ve, South -ve) determined by satellite

LOND 7 NS *N* LONGITUDE IN DEGREES (East +ve, West -ve) determined by satellite

(In this subset longitude is stored as a positive value i.e., western longitudes are expressed in the range 180-360 degrees East)

QPOS 7 AA N QUALITY CONTROL FLAG FOR GEOGRAPHIC POSITION
One character quality control flag applicable to the latitude and longitude recorded for a given geographic location - coded as for FFFF above

SCDT 7 LG D DIRECTION TO WHICH SEA SURFACE CURRENT IS FLOWING (degrees relative to True North) from drift measurement

SCSP 7 LG D SEA SURFACE CURRENT SPEED (meters/second) from drift measurement

SSTP 7 PR D SEA SURFACE TEMPERATURE (degrees Celsius) measured *in situ* probe

TEMP 7 XX D SEA TEMPERATURE (degrees Celsius) at depth

WDIR 7 XX A DIRECTION FROM WHICH WIND IS BLOWING (degrees relative to True North)

WSPD 7 XX A HORIZONTAL WIND SPEED (meters/second)

YEAR 7 ZT N CALENDAR YEAR

7. USER OPTIONS/EXTENSIONS TO THE SUBSET

7.1 The grouping of data series into a single file is at the user's discretion. For example, he may wish to include all of the series from buoys of one nationality or area into a single file. If the files are constructed to contain only a single series, then the contents of the file header record will be virtually the same as the following series header record.

7.2 A limited extension of the DRIBU form involving additional meteorological parameters or other indicators maybe accommodated within the subset specification by making use of the 16 blank characters at the end of the first 80 characters of the DRIBU report data cycle. Thus, for example, the addition of one parameter field expressed in 15 format may be achieved by modifying the '16 X,' element in record 002 of the data cycle definition record to read '15, 11 X,' and by inserting an appropriate definition of the parameter following record 033.

7.3 If the DRIBU report includes temperatures at more than 10 depths the subset maybe extended to cover up to 20 depth levels by modifying the data cycle definition record in Section 5 as follows:

a) record 001: modify characters 6 to 8 from' 65' to '105' and the repeat count in characters 35,36 from' 11' to ' 7'
b) record 003: modify format from 10(I3,A1,I3,A1)),80X) to 20(I3,A1,I3,A1)),160X)
c) record 073: change byte 2 from '5' to '4'
d) record 080 onwards: insert parameter definitions DEPH, FFFF, TEMP, FFFF for each of the ten extra depth levels continuing onto two additional definition records

The above modifications have the effect of extending each DRIBU report to three 80 character records and reducing the number of reports per data cycle from 11 to 7.

7.4 If the format of the data cycle record is modified, as suggested in 7.2 or 7.3, and if this results in different formats applying to each data file, then the appropriate data cycle definition records should be inserted at the head of each data file, following the file header record, rather than in the tape header file as shown in Section 3.

MARINE GEOPHYSICAL DATA (Bathymetry, Magnetics and Gravity)

1. INTRODUCTION

1.1 In designing this subset it is recognized that many bilateral exchanges of marine geophysical data currently take place through the medium of the MGD77 format. Indeed, an effective data bank already exists at the WDC-A (Marine Geology and Geophysics), Boulder with MGD77 as its storage format. This GF3 subset is not intended, therefore, to replace the MDG77 format but is rather meant to provide a compatible alternative for those wishing to use it. It also provides a development path capable of evolving to accommodate datasets that include parameters other than those present in the fixed fields of the MGD77 format.

2. CHARACTERISTICS OF THE SUBSET

2.1 This subset caters for underway measurements at sea of bathymetry, magnetics and gravity. It also provides information on the tracks along which analogue seismic profiling data was collected.

2.2 The data are organized into multi-series files, as illustrated in Section 3. The grouping of data series into files is at the user's discretion; for example each file may represent a different cruise and each series a different leg within that cruise.

2.3 Each series contains a time sequenced set of underway measurements from a specific platform. Within the series each data cycle contains entries for date, time (GMT), latitude, longitude, bathymetric two-way travel time and corrected depth, total and residual magnetic field, observed gravity and free air gravity anomaly, and a flag field to indicate whether seismic profiling data was collected. One character quality control flags are included for the navigation, bathymetry, magnetic and gravity data to enable suspect values to be flagged by the originator or the receiving data centre - the flags are coded according to GF3 Code Table 6. Also included are a flag to indicate whether the position coincides with a primary navaid fix, and fields for the applied magnetic correction (if any), and the sound velocity correction area.

2.4 The data cycles are formatted into data cycle records according to the data cycle definition record in 4.2. Each data cycle record is designed to carry up to 23 data cycles - blank characters in the format specification permit a neat 80 column layout. Note that the year of observation is defined as a header parameter, and is included once only in each data cycle record. If the year changes then the data should be continued starting with a new data cycle record.

2.5 Null values are not specified for the parameters YEAR, DATE, HOUR, MINS, LATD and LOND -in this subset these fields are mandatory. For the remaining numeric parameters, null values of zero (dummy value code ' 1' = single zero) are specified wherever possible, although null values of -9999 (dummy value code '-94' = four 9's prefixed with a minus sign are specified for residual magnetic field and free air gravity anomaly to avoid confusion with 'real' data.

2.6 An annotated listing of a sample data cycle record, formatted according to the data cycle definition record shown in 4.2, is given in Section 5.2.

2.7 The sixth and seventh characters of the GF3 Parameter Code constitute a method code that provides information on how the parameter was measured or computed thus: for bathymetric depth (BATH) they define the method of correcting (or not) for the varying velocity of sound; for 'residual magnetic field (MAGR) they identify the reference field used; and for free air gravity anomaly (GFAA) they define the gravity formula used and the reference system. As the method codes are important to a proper understanding of the data, and as they may vary between series, the subset has been designed so that the method codes are specified uniquely for each individual series in the user formatted area (last 1520 characters) of the series header record.

2.8 The format and content of the user formatted area of the series header record is defined by the series header definition record given in 4.1, and is illustrated by the sample listing shown in 5.1. This area includes the method

codes (parameter MMMM7AAN) for each of the parameters BATH, MAGR and GFAA, together with a code (DATM) identifying the datum to which the bathymetric measurements refer, and a parameter (ATRK) for the tow distance of the magnetometer behind the ship. Each of these fields is also accompanied by a 78 character (or 76 characters for ATRK) plain language text field. It should be noted that in GF3 the parameters MMMM, TEXT and ATRK are defined in general terms; the specific parameters to which they relate are identified by the secondary parameter code entry in cols. 67-74 of the definition record (see 4.1).

2.9 The plain language records following the tape header, file header and series header records are optional but should be used, as appropriate, so as to ensure that the data contained on the tape are adequately described and documented. A checklist of items to be considered maybe found below in paragraphs 2.11 and following.

2.10 It should be noted that the parameters (including code tables where appropriate) contained in this subset can be mapped directly into the MGD77 format without loss of information.

2.11 Documentation appropriate to the data is compiled into the plain language records. Suggested items include:

2.12 NAVIGATION

(i) instrumentation;
(ii) method of determination of along track positions, including identification of prime navaid;
(iii) originator's assessment of navigational accuracy and report on any malfunctions or errors.

2,13 MAGNETICS

(i) instrumentation;
(ii) instrumental sampling rate;
(iii) recording method(s);
(iv) digitization method (including digitization rate);
(v) sensor depth;
(vi) Description of corrections and method of applying regional field;
(vii) originator's assessment of data quality and report on any malfunctions or errors.

2.14 BATHYMETRY

(i) instrumentation (including frequency, beam width, sweep speed of recorder and sampling rate);
(ii) recording method(s);
(iii) digitization method (including digitization rate e.g., 5 reins plus peaks and troughs);
(iv) assumed sound velocity and description of corrections;
(v) originators assessment of data quality and report on malfunctions or errors

2.15 SEISMICS

(i) instrumentation (including size of sound source, recording frequency filters, number of channels);
(ii) recording method(s).

2.16 GRAVITY

(i) instrumentation;
(ii) sampling rate (instrumental);
(iii) recording methods;
(iv) digitization method (including digitization rate);
(v) description of corrections and magnitude of drift and tares;
(vi) base stations - name and location of sites including station/network numbers; base station gravity values at sea-level (network values preferred). Method of tying on-board measurements to base stations;
(vii) originators assessment of data quality and report on any malfunctions or errors.

3. RECORD SEQUENCE

Test File Record	Test Record EOF	* optional records
Tape Header File	Tape Header Record * Plain Language Record(s) Series Header Definition Record Data Cycle Definition Record EOF	
Data File 1	File Header Record * Plain Language Record(s) Series Header Record * Plain Language Record(s) Data Cycle Record(s) Series Header Record * Plain Language Record(s) EOF	Cruise 1 Leg 1 Leg 2
Data File N	File Header Record * Plain Language Record(s) Series Header Record * Plain Language Record(s) Data Cycle Record(s) Series Header Record * Plain Language Record(s) EOF	Cruise N Leg 1 Leg 2
Tape Terminator File	File Header Record (dummy entries) End of Tape E O F EOF	

4. DEFINITION RECORDS

4.1 SERIES HEADER DEFINITION RECORD

(insert geo4. 1)

4.2 DATA CYCLE DEFINITION RECORD

(insert geo4.2)

5.1 LISTING OF SAMPLE SERIES HEADER RECORD - USER FORMATTED AREA OF RECORD FORMATTED ACCORDING TO THE DEFINITION GIVEN IN 4.1

(insert geo5. la)
(insert geo5. lb)

5.2 ANNOTATED LISTING OF SAMPLE DATA CYCLE RECORD FORMATTED ACCORDING TO THE DEFINITION GIVEN IN 4.2

(insert geo5.2)

6. STANDARD GF3 PARAMETER CODES USED IN THIS SUBSET

PPPP KK MM S

ATRK 7 XX N ALONG TRACK DISPLACEMENT (meters, astern +ve)

Horizontal along track displacement of measurement point (e.g., towed sensor) behind moving platform (e.g., ship or aircraft).

BATH 7 --N BATHYMETRIC DEPTH (meters)

Echo-sound depth corrected for transducer depth. The first character of the method code defines whether the depth has been corrected for the varying speed of sound in seawater viz:

C- corrected depth
U- uncorrected depth (see below for assumed sound velocity)
R- Corrected depth including corrections for refraction effects (non-vertical beams only)

The second character defines the correction procedure:

-T "Echo-sounding correction tables", 3'* edition N.P. 139 (UK)
-M Matthews Tables N.P. 139 (UK), 2"* edition
-V Velocimeter dips
-W W.D. Wilson (1960) formula on T-S data
-K S. Kuwahara formula on T-S data.
-G V.A. Del Grosso (1972) formula on T-S data
-Z Other (described in documentation accompanying the data)

UA Uncorrected depth; assumed sound velocity = 1500 meters/second
UF Uncorrected depth; assumed sound velocity = 800 fathoms/second(=1463 meters/second)
UZ Uncorrected depth; assumed sound velocity = value other than 1463 or 1500 meters/second (value specified in plain language documentation)

DATE 7 ZT N DATE WITHIN YEAR IN FORMAT MMDD (GMT)

Where MM= calendar month and DD = day of month

DATM 7 --N BATHYMETRIC DATUM

Code to identify the common datum to which bathymetric depth values have been corrected - this correction should not be confused with corrections for transducer depth or for the varying speed of sound in sea water.

The code table in use is defined by the method code viz:

AA MGD77 Bathymetric Datum Code (US National Geophysical Data Centre) with the following code values:
00 -No correction applied (sea-level)
01- Lowest normal low water
02- Mean lower low water
03- Lowest low water

04- Mean lower low water spring
05- Indian spring low water
06- Mean low water spring
07- Mean sea-level
08- Mean low water
09- Equatorial spring low water
10- Tropic lower low water
11- Lowest astronomical tide
88- Other, specified in documentation accompanying data

FFFF 7AA N QUALITY CONTROL FLAG

This indicates a quality control flag applicable to the value of the immediately preceding parameter in the 'user-defined area'.

Flag coded as in GF3 Code Table 6 thus:

Code	Descriptor
blank	unspecified or quality control check has not been made
A	Acceptable: data found acceptable during quality control checks
S	Suspect Value: data considered suspect (but not replaced) by the data originator on the basis of either quality control checks or recorder/instrument/platform performance
Q	Questionable Value: data considered suspect (but not replaced) during quality control checks by persons other than those responsible for its original collection e.g., a data. centre
R	Replaced Value: erroneous or missing data has been replaced by estimated or interpolated value - method by which replacement values have been derived should be described in plain language records
M	Missing Value: original data erroneous or missing

FIXF 7 AA N PRIME NAVIGATION AID FIX FLAG

Flag to indicate whether the position of the measurement point was obtained directly as the result of a fix from the prime navigation aid. This parameter is used primarily with underway measurements in order to highlight the occurrence of fixes.
One character flag set to 'F' if position is a primary navaid position fix, otherwise left blank.

GFAF 7-- N GRAVITY FREE-AIR ANOMALY (milligals)

Free-air Anomaly = Observed Gravity - Theoretical Gravity
The theoretical gravity formula used is identified by the first character of the method code viz:

A- Heiskanen 1924 = $978.052\,(1 + 0.005285\sin^2(\text{lat}) - 0.0000070\sin^2(2*\text{lat}) + 0.000027\cos^2(\text{lat})\cos^2(\text{long} - 18_i))$

B- International 1939 = $978.0490\,(1 + 0.0052884\sin^2(\text{lat}) - 0.0000059\sin^2(2*\text{lat})$

C- IAG System 1967 = $978.03185\,(1 + 0.005278895\sin^2(\text{lat}) + 0.000023462\sin^4(\text{lat}))$

Z- Other (described in documentation accompanying the data)

The reference system is specified in the second character of the method code viz:
-A System IGSN 1971

-P	Potsdam system
-L	Local system (described in documentation accompanying the data)

GRAV *7* XX *N* OBSERVED GRAVITY (milligals)
Observed gravity corrected for Eotvos, drift, bias and tares

HOUR *7* ZT N HOURS WITHIN DAY (GMT)

LATD 7 XX N LATITUDE IN DEGREES (North +ve, South -ve)

LOND 7 XX N LONGITUDE IN DEGREES (East +ve, West -ve)

MAGC 7 XX N MAGNETIC FIELD CORRECTION (nanoteslas = gammas)
Correction applied to magnetic field measurement to compensate for diurnal, storm or other effects as described in the data documentation

MAGR 7-- N RESIDUAL MAGNETIC FIELD (nanoteslas = gammas)
Residual Field = Total Field - Reference Field
The reference field is identified by the method code thus:

AA	IGRF 1965
AB	IGRF 1975
AC	IGRF 1980
DA	DGRF 1965
DB	DGRF 1970
DC	DGRF 1975
PA	PGRF 1975
XX	Other reference field (described in documentation accompanying the data)

MAGT 7 XX N TOTAL MAGNETIC FIELD (nanoteslas = gammas)

MINS *7* ZT N MINUTES WITHIN HOUR (GMT)

MMMM 7 AA N METHOD CODE IN USER DEFINED AREA
This indicates that the method code MM appropriate to a specific stored parameter instead of being entered in bytes 8-9 of the Definition Record record defining that stored parameter is entered in a 'user-defined area' i.e., it is itself a header or data cycle parameter.
The Definition Record record defining this method code parameter has bytes 3-10 set to MMMM7AAN and bytes 67-74 (secondary parameter code) set to the code of the parameter to which the method code parameter is to apply

SVCZ 7 XX N BATHYMETRY SOUND VELOCITY CORRECTION AREA
Identifier of the correction table used to correct bathymetric depths for the varying speed of sound in sea water. Thus, with bathymetric depth parameter BATH7CTN it refers to the correction area number from the Third Edition Tables: for BATH7CMN the Matthews Area number

TEXT 7 XX N PLAIN LANGUAGE TEST
Used for creating plain language area in the 'user-defined area' of a series header record

TWTT 7 XX N BATHYMETRIC TWO WAY TRAVEL TIME (seconds)
Two way echo-sound travel time corrected for transducer depth and other such factors (e.g., motor speed) as are defined in the documentation accompanying the data

YEAR 7 ZT N CALENDAR YEAR

7. USER OPTIONS

7.1 This subset covers the most commonly used parameters present in the data cycles of the MGD77 format. It does not include Eotvos corrections (which can be implied from the navigational data), seismic shot point identification, depth of magnetometer or readings from a second magnetometer. However, these or other additional parameters may be appended to the data cycles simply by adding their definition to the end of the data cycle definition record (continuing onto a second definition record if necessary), and by modifying the FORTRAN format specification. It should be noted that the capability exists within the GF3 parameter code (character 5) for the user to define his own parameters - it is important that a full definition of such parameters, together with their codes and units, is included in the plain language records of the tape header file.

MEAN SEA-LEVEL (PSMSL)

1. INTRODUCTION

1.1 This subset represents the output format in which the Permanent Service for Mean Sea-Level is prepared to make available copies of its Revised Local Reference (RLR) global bank of mean sea-level data.

2. CHARACTERISTICS OF THE SUBSET

2.1 The data are organized into a single multi-series data file as illustrated in Section 3.

2.2 Each series contains time sequenced mean sea-level data for a single fixed location. Two types of data are held for each series, monthly means and annual means.

2.3 The annual means are held in data cycles placed in the user formatted area of the series header record, as defined by the definition record given in Section 4,1. Each data cycle contains values for the parameters year, annual mean sea-level, and a quality code.

2.4 A single series header record can contain up to 114 annual means. If more than 114 annual means are available, series header byte 397 is set to ’1‘ and the annual means are continued on a second series header record (immediately following the first) with bytes 1-400 set identical to that in the first series header record (except of course for bytes 2, 377-386, and 397).

2.5 The monthly means are held in data cycle records formatted according to the definition record given in Section 4.2. Each data cycle contains values for the parameters year, month, monthly mean sea-level, and a 2 digit quality flag (FFFF6XXN) whose contents specify the number of days of data missing in the raw data from which the monthly mean was calculated. Each data cycle record allows for up to 138 monthly means - further data cycles may be continued on succeeding data cycle records.

2.6 Null values are not specified for the parameters YEAR in the series header record and YEAR and MNTH in the data cycle record. In this subset these fields are mandatory.

3. RECORD SEQUENCE

Test File	Test Records EOF	* optional records
Tape Header File	Tape Header Record * Plain Language Record(s) Series Header Definition Record Data Cycle Definition Record EOF	
Data File	File Header Record * Plain Language Record(s) Series Header Record * Plain Language Record(s) Data Cycle Record(s) Series Header Record * Plain Language Record(s) Data Cycle Record(s) etc. EOF	Location 1 Location 2
Tape Terminator File	File Header Record (dummy entries) End of Tape Record EOF EOF	

4. DEFINITION RECORDS

4.1 SERIES HEADER DEFINITION RECORD

(insert ms14.1)

4.2 DATA CYCLE DEFINITION RECORD

(insert ms14.2)

5.1 ANNOTATED LISTING OF SAMPLE DATA CYCLE RECORD FORMATTED ACCORDING TO THE DEFINITION GIVEN IN 4.1

(insert ms15.1)

5.2 ANNOTATED LISTING OF SAMPLE DATA CYCLE RECORD FORMATTED ACCORDING TO THE DEFINITION GIVEN IN 4.2

(insert ms15.2)

6. PARAMETER CODES REFERENCED IN THE SUBSET

PPPP K MM S

FFFF 6 XX N FLAG FOR MISSING DAYS

FFFF 7 XX N QUALITY CONTROL FLAG

Quality control flag applicable to the value of the immediately preceding parameter in the 'user-defined area'.

The quality code (FFFF7AAN) makes use of just one of the entries in GF3 Code Table 6 (validation flag) viz.:

Q - Questionable Value which is taken to mean that the annual mean is affected by missing or interpolated data otherwise it is left blank. If no annual mean was calculated, the mean sea-level is set to its null value (i.e., 9's).

MNTH 7 ZT N MONTH

SLEV 7 XX D SEA-LEVEL (ANNUAL MEAN) (M)

YEAR 7 ZT N CALENDAR YEAR

7. USER OPTIONS

7.1 This subset is used as a fixed output format for PSMSL - The Permanent Service for Mean Sea-Level; there are no options provided.

MEASURED WAVE SPECTRA

1. INTRODUCTION

1.1 The subset is designed for spectra of surface wave elevation variance computed directly from instrumental measurements.

2. CHARACTERISTICS OF THE SUBSET

2.1 The data files are configured as multi-series data files as illustrated in Section 3.

2.2 Each data series contains a time series of individual spectra from a given location; each individual spectrum being designed to map into a single data cycle record, as defined by the definition record given in Section 4.

2,3 Each data cycle record contains a number of header parameters, common to the spectrum as a whole, followed by a maximum of 138 spectral estimate data cycles each containing the frequency associated with an individual spectral estimate, together with the spectral density of the estimate itself. The data cycles are ordered in ascending sequence of frequency. Blank characters in the format specification permit a neat 80 column layout.

2.4 If the individual spectrum exceeds more than 138 spectral estimates, the spectrum maybe continued on the next data cycle record by use of the header parameter CCCC7AAN which is set as follows:

0 : individual spectrum completed within this data cycle record

1: individual spectrum continues on next data cycle record

The header parameters in the second data cycle record should be identical to those in the first, except for the overflow indicator which will be set to zero unless the spectrum overflows onto yet more data cycle records. Note that the number of spectral estimate data cycles in each record is contained in characters 3 to 6 of the data cycle record. A new data cycle record is started for each individual spectrum.

2.5 The parameters wind speed, wind direction, characteristic wave height and peak period of the wave spectrum are also included with each spectrum so as to enable the recipient of the tape to select and study spectra according to wind or wave conditions. Wind data are only entered if available in close proximity of the wave measuring site - otherwise wind speed and direction are set to their null values. The geographic co-ordinates of the wind measuring site and the circumstances of the wind measurements (particularly anemometer height) should be included in the plain language records.

2.6 Two single character quality control flag parameters (FLAG) are included for each spectrum - their usage is user defined. The user should clearly describe in the plain language records how each of these flags is used. Blank characters are entered if the flags are not used.

2.7 Null values are not specified for the parameters YEAR, DATE, HHMM and CCCC. In this subset, these fields are mandatory for each data cycle record. Similarly, the field SPCF and its preceding EEEE field are mandatory for each data cycle.

2.8 The user formatted area of the series header is not used in this subset and should be left blank.

2.9 Liberal use should be made of the plain language records following the file header or series header records, as appropriate, so as to ensure that the data are adequately described and documented.

3. RECORD SEQUENCE (with one series per data tile)

Test File	Test Records EOF		* optional records
Tape Header File	Tape Header Record * Plain Language Record(s) Data Cycle Definition Record EOF		
Data File 1	File Header Record * Plain Language Record(s) Series Header Record * Plain Language Record(s) Data Cycle Record(s) etc. Data Cycle Record(s) etc. Series Header Record * Plain Language Record(s) Data Cycle Record(s) etc. Data Cycle Record(s) etc. EOF	Spectrum 1 Spectrum 2 Spectrum 1 Spectrum 2	Location 1 Location 2
Data File N	File Header Record * Plain Language Record(s) Series Header Record * Plain Language Record(s) Data Cycle Record(s) etc. EOF	Spectrum 1	Location M
Tape Terminator File	File Header Record (dummy entries) End of Tape Record EOF EOF		

4. DEFINITION RECORDS

4.1 DATA CYCLE DEFINITION RECORD

(insert spec4.1)

5. ANNOTATED LISTING OF SAMPLE DATA CYCLE RECORD FORMATTED ACCORDING TO THE DEFINITION GIVEN IN 4.1- A SINGLE COMPLETE SPECTRUM

(insert spec5)

6. PARAMETER CODES REFERENCED IN THE SUBSET

PPPP K MM S

BAND 7 XX N BANDWIDTH OF SPECTRAL ANALYSIS (hertz)

CCCC 7 AA N DATA CYCLE OVERFLOW INDICATOR

One character code as follows:
O = data cycles completed within this record
1 = data cycles continued on the next record

DATE 7 --N DATE WITHIN YEAR IN FORMAT MMDD

LE	Time of observation end (local time)
LS	Time of observation start (local time)
LT	Time of observation (local time)
ZE	Time of observation end (GMT)
ZS	Time of observation start (GMT)
ZT	Time of observation (GMT)

DRSC 7-- N DURATION (SECONDS)

PR	Duration of processed observation
SS	Duration of individual sample

EEEE 7 XX N DECIMAL EXPONENT

FFFF 7-- N QUALITY CONTROL FLAG

Quality control flag applicable to the value of the immediately preceding parameter in the 'user-defined area'. It is coded as follows:

Code	Descriptor
blank	Unspecified or quality control check has not been made
A	Acceptable: data found acceptable during quality control checks
S	Suspect Value: data considered suspect (but not replaced) by the data originator on the basis of either quality control checks or recorder/instrument/platform performance
Q	Questionable Value: data considered suspect (but not replaced) during quality control checks by persons other than those responsible for its original collection e.g., a data centre
R	Replaced Value: erroneous or missing data has been replaced by estimated or interpolated value - method by which replacement values have been derived should be described in plain language records
M	Missing Value: original data erroneous or missing

FLAG 2 XX N USER DEFINED FLAG

FREQ 7-- N FREQUENCY (hertz)

PR	Frequency of processed observations
SS	Original sampling/digitization interval

HHMM 7-- N TIME WITHIN DAY IN FORMAT HHMM

LE	Time of observation end (local time)
LS	Time of observation start (local time)
LT	Time of observation (local time)
ZE	Time of observation end (GMT)
ZS	Time of observation start (GMT)
ZT	Time of observation (GMT)

SPCF 7 XX N FREQUENCY OF SPECTRAL COMPONENT (hertz)

VCAR 7-- D CHARACTERISTIC WAVE HEIGHT (4*RMS) (meters)

X-	Unspecified method of calculation
F-	Fourier transform calculation
L-	Lag correlation calculation
C-	Simple computer analysis calculation
M-	Manual analysis of chart
E-	Visual estimation
-X	Unspecified sensor
-U	Unspecified instrumented sensor
-A	Accelerometer
-B	Ship borne wave record
-E	Inverted echo sounder
-L	Laser altimeter
-P	Bottom mounted pressure device
-R	Satellite altimeter
-S	Staff gauge
-V	Visual

VSDN 7-- D WAVE VARIANCE SPECTRAL DENSITY (S(f) m**2/Hz)

X-	Unspecified method of calculation
F-	Fourier transform calculation
L-	Lag correlation calculation
C-	Simple computer analysis calculation
M-	Manual analysis of chart
E-	Visual estimation
-X	Unspecified sensor
-U	Unspecified instrumented sensor
-A	Accelerometer
-B	Ship borne wave record
-E	Inverted echo sounder
-L	Laser altimeter
-P	Bottom mounted pressure device
-R	Satellite altimeter
-s	Staff gauge
-v	Visual

VTPK 7--D WAVE SPECTRUM PEAK PERIOD (seconds)

X-	Unspecified method of calculation
F-	Fourier transform calculation
L-	Lag correlation calculation
C-	Simple computer analysis calculation
M-	Manual analysis of chart
E-	Visual estimation
-X	Unspecified sensor
-U	Unspecified instrumented sensor
-A	Accelerometer
-B	Ship borne wave record
-E	Inverted echo sounder
-L	Laser altimeter
-P	Bottom mounted pressure device
-R	Satellite altimeter
-S	Staff gauge
-V	Visual

WDIR 7 XX A DIRECTION FROM WHICH WIND IS BLOWING (degrees relative to True North)

WSPD 7 XX A HORIZONTAL WIND SPEED (m/s)

YEAR 7 --N CALENDAR YEAR

LE	Time of observation end (local time)
LS	Time of observation start (local time)
LT	Time of observation (local time)
ZE	Time of observation end (GMT)
ZS	Time of observation start (GMT)
ZT	Time of observation (GMT)

7. USER OPTIONS

7.1 The subset has been designed as a fixed format which the user is not encouraged to modify. However, the subset does include a number of user options.

7.2 The grouping of data series into files is at the user's discretion. For example, he may wish to store only related series in the same file e.g., data series from an array of moorings during a specific cruise, from a specific fixed station or from a specific laboratory. Alternatively he may wish to group all his data in the same file.

7.3 The subset as defined in Section 4 assumes that the wave data have been derived by the Fourier Analysis of recordings from an accelerometer buoy i.e., the relevant method fields have been set to 'FA' in columns 8-9 of the data cycle definition record. If other methods are in use, these entries should be modified according to the appropriate method codes given in the GF3 Parameter Code Table. Alternatively, they may be set to 'XX' i.e., unspecified, in which case the methods should be clearly identified in the plain language records.

7.4 If the same data cycle definition record (including its method codes) is applicable to all data on the tape, then it need only be inserted once i.e., in the tape header file. If not, then an appropriate data cycle definition record should be inserted at the head of each data file following the plain language records, if any, instead of in the tape header file as shown in 3.

SEA BEAM DATA

1. INTRODUCTION

1.1 The subset is designed for underway measurements at sea using multi-beam echo sounders. It caters for simultaneous measurements, on either side of the vessel, of depths from up to 16 beams aligned perpendicular to the vessel's track. Guidelines are provided for extending the subset to accommodate data from systems with more than 16 beams.

2. CHARACTERISTICS OF THE SUBSET

2.1 The subset assumes that the two way travel time of each beam has been transformed, on the basis on an appropriate model for the velocity of sound in sea water, into an oblique distance which has been converted - after compensation for roll - into a horizontal cross track distance and a vertical depth.

2.2 Each data cycle in the subset consists of the simultaneous measurement of cross track displacement and bathymetric depth from each of 16 beams. Within the data cycle the beams are arranged in a non-centred configuration commencing with the left most (port) beam and working through in sequence to the right most (starboard) beam. Beam measurements that are considered erroneous or non-existent are replaced by zeros. The cross track displacement is expressed as a negative number on the port side and a positive number on the starboard side.

2,3 In addition to the beam measurements, each data cycle also includes the date and time (GMT) of the measurements, latitude, longitude and heading of the vessel, quality control information on the navigation, and a one character flag field (parameter 'FIXF') which is set to 'F' if the position is the direct result of a prime navaid fix (otherwise left blank)

2.4 The navigation quality control information can be expressed in one of two forms:

(a) using a one character flag (parameter 'FFFF') indicating whether or not the position is considered suspect by the originator (blank = unspecified; 'A' = acceptable; 'S' = suspect). Supporting documentation on suspect values will normally be provided in plain language records;

(b) using an error ellipse expressed in terms of its semi-major and semi-minor axes and major axis azimuth and calculated according to a specified confidence level. For the present this use will normally be for TRANSIT satellite fixes but, as navigation techniques develop, it maybe used to assign an error ellipse to each point along the track that can then be used to determine how much each point can be shifted. The method of determination, and confidence level, of the ellipse should be described in plain language records.

2.5 The data are formatted into data cycle records according to the data cycle definition records in 4.2 -as each beam is allocated its own storage parameters the definition extends over 3 data cycle definition records. Each data cycle record is designed to carry up to 8 data cycles - blank characters in the format specification permit a neat 80 column aligned layout. Null values are not specified for date, time, latitude and longitude as valid entries are required for these fields. For the remaining numeric parameters, null values of zero (dummy value code ' 1' = single zero) are specified, except for ship's heading (parameter 'HEAD') whose null value is specified as '9999' (dummy value code '94' = four 9's).

2.6 An annotated listing of a sample data cycle record, formatted according to the data cycle definition records shown in 4.2, is given in Section 5.2.

2.7 The data cycle records are organized into series and files within the record structure shown in Section 3. The actual grouping of the data cycle records into series and thence into files is flexible and may be chosen to suit the pattern of data collection. One possible scheme would be to start a new file at the commencement of each

detailed survey or long traverse. Within each file a new series could be created at the start of each GMT day, at a break in the data, or whenever the sound velocity profile changed.

2.8 The format and content of the user formatted area (last 1520 characters) of the series header record is defined by the series header definition record given in 4.1 and is illustrated by the simple listing shown in 5.1. The area starts with a 2 character bathymetry method code (parameter 'MMMM') identifying the method of correcting the bathymetric values in the series for the varying velocity of sound in sea water (see 2,9). This is followed by a 78 character text field (parameter 'TEXT') where the correction method is identified in plain language form. The remaining space (i.e., last 1440 characters) is made available for sound velocity profile data. The date, time (GMT), latitude and longitude of the velocimeter dip are stored together with up to 85 data cycles, each consisting of an observation depth and a measurement of sound velocity at that depth. The actual number of depths, i.e., data cycles, is stored in characters 377-386 of the fixed part of the station header record; the remaining data cycles being left blank.

2.9 Bathymetry method code: the first character of the code specifies whether the depths have been corrected for sound velocity variations thus -

C = corrected depth but without corrections for refraction effects on non-vertical beams

R = corrected depth including correction for refraction effects on non-vertical beams

U = uncorrected depth i.e., nominal sound velocity assumed

If the first character is set to 'U' the second character specifies the assumed sound velocity thus -

A = assumed sound velocity of 1500 m/s

F = assumed sound velocity of 800 fm/s i.e., 1463 m/s

Z = other sound velocity value assumed as specified in plain language documentation.

If the first character is set to 'C' or 'R' the second character defines the correction procedure used thus -

T = "Echo-sounding correction tables", 3" edition N.P. 139 (UK)

M = Matthews Tables, 2nd edition N.P.139 (UK)

V = velocimeter dips

W = W .D. Wilson (1960) formula on T-S data

K = S. Kuwahara formula on T-S data

G = V.A. Del Grosso (1972) formula on T-S data

Z = other (described in documentation accompanying the data)

2.10 In the data cycles latitude and longitude are each expressed as 2 parameters - the first in whole degrees, the second in minutes within degree to 0.0001 min (approx 0.2m) - note that these parameters are additive and, both may be signed - usually with the same sign. However, where one or other parameter is zero, please do not prefix it with a minus sign as minus zero values are unacceptable on some computers.

2.11 Where the definition records are applicable to all the data on the tape they are inserted in the tape header file as shown in Section 3. However, where the data on tape is of mixed origin, individual files maybe formatted with

different definition records - in such cases the appropriate definition records should be inserted at tile level immediately before the series header records.

2.12 As mentioned, the subset gives flexibility in the way in which data maybe grouped into series and files, and the user is encouraged to group the data in the manner he considers most appropriate. The following guidelines may be found useful:-

(i) in submitting multi-beam data to a national centre for archiving, start each cruise (port to port) on a new tape;

(ii) the physical splitting of data files across tapes is strongly discouraged - either terminate the file at the end of the tape and start a new one at the beginning of the next tape, or take the file completely over to the next tape;

(iii) where selected extracts of multi-beam data from a number of different cruises are being exchanged, there may be a requirement to create multi-cruise tapes - each such cruise should start with a new file;

(iv) in general, no series should include more than about a day's data;

(v) so as to enable the recipient to select our extracts of the data on tape in a computer efficient matter, it is advisable to keep the data files down to a reasonable size - perhaps a few day's data at the most.

2,13 Tapes will normally be prepared at a density of 1600 bpi and a block size of 1920 characters (i.e., one GF3 record). However, if tape usage is critical then, by agreement between the exchanging parties, the density may be increased to 6250 bpi and/or the block size increased - integral number of 1920 bytes only. The block size should be constant for the tape. The effect of density and block size on tape usage is shown below where the length of tape occupied by one day of data is given, assuming 16 beams with 10 ping cycles/minute:

DENSITY \ BLOCK SIZE=	1 GF3 record (1920 bytes)	4 GF3 records (7680 bytes)
1600 bpi	270 foot	200 foot
6250 bpi	90 foot	60 foot

2,14 Liberal use should be made of plain language records so as to ensure that the data are adequately described and qualified for use by persons other than the data originator, and without the need for recourse to the data originator.

2.15 GF3 provides the user with flexibility in that plain language records maybe inserted at tape, file or series level as shown in Section 3. For Sea-Beam data it is suggested that the documentation is best prepared at a cruise level. Where the tape only contains data from a single cruise, it is preferred that all relevant documentation should be compiled into the tape header file. If the cruise spreads over many tapes it maybe considered desirable to repeat this documentation at the head of each tape so as to ensure that each tape is self contained. Where the tape is a composite of data extracted from many different cruises, then file level documentation may be considered more appropriate.

3. RECORD SEQUENCE

Test File	Test Records EOF		* optional records
Tape Header File	Tape Header Record * Plain Language Record(s) Series Header Definition Record Data Cycle Definition Record EOF		
Data File 1	File Header Record * Plain Language Record(s) Series Header Record Data Cycle Record(s) Series Header Record Data Cycle Record(s) etc. EOF	Possible data Detailed Survey 1 (or Traverse 1) Day 'n' Day 'n+l'	arrangement
Data File 2	File Header Record * Plain Language Record(s) Series Header Record Data Cycle Record(s) Series Header Record Data Cycle Record(s) etc. File EOF EOF	Detailed Survey 2 (or Traverse 2) Day 'n' Day 'n+ 1'	End of Tape Record

4. DEFINITION RECORDS

4.1 SERIES HEADER DEFINITION RECORD
(insert beam4.1)

4.2 DATA CYCLE DEFINITION RECORD (1 OF 3)
(insert beam4.2a)

4.2 (CONT.) DATA CYCLE DEFINITION RECORD (2 OF 3)
(insert beam4.2b)

4.2 (CONT.) DATA CYCLE DEFINITION RECORD (3 OF 3)
(insert beam4.2c)

5. ANNOTATED LISTINGS

5.1 LISTING OF SAMPLE SERIES HEADER RECORD - USER FORMATTED AREA OF RECORD FORMATTED ACCORDING TO DEFINITION GIVEN IN 5.1
(insert beam5.la)
(insert beam5.lb)

5.2 ANNOTATED LISTING OF SAMPLE DATA CYCLE RECORD FORMATTED ACCORDING TO THE DEFINITION GIVEN IN 5.2
(insert beam5.2)

6. PARAMETER CODES REFERENCED IN THE SUBSET

PPPP K MM S

BATH 7 --N BATHYMETRIC DEPTH (meters)

C-	Corrected depth
U-	Uncorrected depth
R-	Corrected depth including refraction effects
-T	Used echo sounding correction tables
-M	Used Matthews tables
-V	Used velocimeter dips
-W	Used W.D. Wilson formula on T-S data
-K	Used Kuwahara formula on T-S data
-G	Used Del Grosso formula on T-S data
-Z	Used another technique
UA	Uncorrected depth, assumed sound velocity = 1500m/s
UF	Uncorrected depth, assumed sound velocity = 800 fathoms/s
UZ	Uncorrected depth, assumed sound velocity other than above

DATE 7 --N DATE WITHIN YEAR IN FORMAT MMDD

LE	Time of observation end (local time)
LS	Time of observation start (local time)
LT	Time of observation (local time)
ZE	Time of observation end (GMT)
ZS	Time of observation start (GMT)
ZT	Time of observation (GMT)

DEPH 7-- N SENSOR DEPTH BELOW SEA SURFACE (meters) (positive is down)

PR	Pressure measurement
RT	Reversing thermometer
ES	Echo sounding
WL	Wire length
FX	Fixed (e.g.,. attached to tower or ship hull)
ID	Standard depth for interpolated data
BT	Determined by fall rate
XX	Unspecified

EAZM 7 XX N AZIMUTH OF MAJOR AXIS OF NAVIGATION ERROR ELLIPSE (degrees)

EMAJ 7 XX N LENGTH OF SEMI-MAJOR AXIS OF NAVIGATION ERROR ELLIPSE (meters)

EMIN 7 XX N LENGTH OF SEMI-MINOR AXIS OF NAVIGATION ERROR ELLIPSE (meters)

FIXF 7 AA N PRIME NAVIGATION AID FIX FLAG

One character flag set to F if position is a primary navaid position fix, blank otherwise

FFFF 7 AA N QUALITY CONTROL FLAG

Quality control flag applicable to the value of the immediately preceding parameter in the 'user-defined area'. It is coded as follows:

Code	Descriptor
blank	Unspecified or quality control check has not been made
A	Acceptable: data found acceptable during quality control checks
S	Suspect Value: data considered suspect (but not replaced) by the data originator on the basis of either quality control checks or recorder/instrument/platform performance
Q	Questionable Value: data considered suspect (but not replaced) during quality control checks by persons other than those responsible for its original collection e.g., a data centre
R	Replaced Value: erroneous or missing data has been replaced by estimated or interpolated value - method by which replacement values have been derived should be described in plain language records
M	Missing Value: original data erroneous or missing

HEAD 7 XX N PLATFORM HEADING (degrees) (relative to true north)

HOUR 7 --N HOURS WITHIN DAY (hour)

LE	Time of observation end (local time)
LS	Time of observation start (local time)
LT	Time of observation (local time)
ZE	Time of observation end (GMT)
ZS	Time of observation start (GMT)
ZT	Time of observation (GMT)

LATD 7-- N LATITUDE DEGREES (North +ve) (degrees)

CL	Celestial (star fix, sun line)
NS	Satellite navigation
OM	Omega
LA	Loran A
RC	Loran C
EE	Decca
MD	Mid range navigational net (200-500 km)
SH	Short range navigational net (<200 km)
AU	Acoustic (SOFAR, SONAR, etc.)
BB	RADAR
DR	Dead reckoning
XX	Unspecified

LATM 7--N LATITUDE MINUTES WITHIN DEGREE (reins arc)

CL	Celestial (star fix, sun line)
NS	Satellite navigation
OM	Omega
LA	Loran A
RC	Loran C
EE	Decca
MD	Mid range navigational net (200-500 km)
SH	Short range navigational net (<200 km)
AU	Acoustic (SOFAR, SONAR, etc.)
BB	RADAR
DR	Dead reckoning
XX	Unspecified

LOND 7--N LONGITUDE DEGREES (East +ve) (degrees)

CL	Celestial (star fix, sun line)
NS	Satellite navigation
OM	Omega
LA	Loran A
RC	Loran C
EE	Decca
MD	Mid range navigational net (200-500 km)
SH	Short range navigational net (<200 km)
AU	Acoustic (SOFAR, SONAR, etc.)
BB	RADAR
DR	Dead reckoning
XX	Unspecified

LONM 7--N LONGITUDE MINUTES WITHIN DEGREE (East +ve) (reins arc)

CL	Celestial (star fix, sun line)
NS	Satellite navigation
OM	Omega
LA	Loran A
RC	Loran C
EE	Decca
MD	Mid range navigational net (200-500 km)
SH	Short range navigational net (<200 km)
AU	Acoustic (SOFAR, SONAR, etc.)
BB	RADAR
DR	Dead reckoning
XX	Unspecified

MINS 7-- N MINUTES WITHIN HOUR (minutes)

LE	Time of observation end (local time)
LS	Time of observation start (local time)
LT	Time of observation (local time)
ZE	Time of observation end (GMT)
ZS	Time of observation start (GMT)
ZT	Time of observation (GMT)

MMMM 7-- N METHOD CODE IN USER DEFINED AREA

7 AA	Standard two character method code
7 FF	First character only of the standard two character code
6 XX	User defined method code

SECS 7-- N SECONDS WITHIN MINUTE (seconds)

LE	Time of observation end (local time)
LS	Time of observation start (local time)
LT	Time of observation (local time)
ZE	Time of observation end (GMT)
ZS	Time of observation start (GMT)
ZT	Time of observation (GMT)

SVEL 7-- D SOUND VELOCITY (m/s)

PR	*In situ* sound velocity probe
CV	Computed from other parameters
XX	Unspecified

TEXT 7 XX N PLAIN LANGUAGE TEXT

XTRK *7 XX N* ACROSS TRACK DISPLACEMENT (starboard +ve) (meters)

YEAR 7 --N CALENDAR YEAR

LE	Time of observation end (local time)
LS	Time of observation start (local time)
LT	Time of observation (local time)
ZE	Time of observation end (GMT)
ZS	Time of observation start (GMT)
ZT	Time of observation (GMT)

7. USER OPTIONS

7.1 Extending the subset to 21 or 24 beams

The subset as designed accommodates data from systems with up to 16 beams. However, it can be easily extended to cater for systems with up to 21 or 24 beams simply by modifying the data cycle definition records and adjusting the formatting of data in the data cycle records accordingly. Extending the subset to 21 beams reduces the number of data cycles/data cycle records from 8 to 7 (or to 6 for 24 beams).

The following modifications should be made to the data cycle definition records in 5.2 to cater for up to 21 beams:

(i) Replace records 001 to 003 by the following:- (insert beam 7.1);
(ii) Continue XTRK and BATH definitions into records 057 to 066 for beams 17 through 21 respectively.

The following modifications should be made to the data cycle definition records in 5.2 to cater for up to 24 beams:

(i) Replace records 001 to 003 by the following:- (insert beam 7.2);
(ii) Continue XTRK and BATH definitions into records 057 to 072 for beams 17 through to 27 respectively.

Note that there is little advantage to be gained by modifying the subset to other than 21 or 24 beams as an integral number of data cycles are required for each data cycle record. Thus, for example, for a 19 beam system it is recommended to use the 21 beam extended subset and to insert null values for beams 20 and 21.

TRACKOB REPORTS (Sea-surface Observations along a Ship's Track)

1. INTRODUCTION

The subset has been designed for the archival, and dissemination in non-real time, of consecutive sea surface observations along a ship's track reported using the World Meteorological Organization report form FM62-VIII Ext. TRACKOB (as described in Section 5). Additional fields are provided for quality control flags resulting from post-reporting checks on the data.

2. CHARACTERISTICS OF THE SUBSET

2.1 The data are organized into files according to the record sequence illustrated in Section 3, Each series contains the data from a single reporting ship, arranged in time sequenced order. Each file will normally contain only a single series, although this is at the user's discretion. He may, for example, prefer to group all of the series from ships of one nationality, geographic area or time period into the same tile.

2,2 Each series starts with a series header record which includes the ship's identifier (as recorded in the TRACKOB report), the date/time period covered by the series and, optionally the geographic area and limits of geographic latitude and longitude within which the ship was operating. The 'user-defined area' of the series header record is not used and is blank filled.

2.3 The along track data are stored in data cycle records. Each data cycle contains the data reported at a single observation time within a TRACKOB report and includes date, time, latitude, longitude, sea surface temperature, sea surface salinity and sea surface current direction and speed. The averaging period over which each of the sea surface measurements was taken is also included. Post-reporting quality control flags may be stored with the reported values.

2.4 The data cycle records are formatted according to the definition record shown in Section 4. Each data cycle record may contain up to 47 data cycles with each data cycle comprising 40 characters. Note that the year of observation is defined as a header parameter and is included once only in each data cycle record.

2.5 Although the plain language records shown in Section 3 are optional, their use is strongly encouraged so as to ensure that the data are adequately described and documented.

3. RECORD SEQUENCE (with one series per file)

Test File	Test Records EOF	* optional records
Tape Header File	Tape Header Record * Plain Language Record(s) Data Cycle Definition Record EOF	
Data File 1	File Header Record Series Header Record * Plain Language Record(s) Data Cycle Record(s) EOF	Messages from Ship 1
Data File 2	File Header Record Series Header Record * Plain Language Record(s) Data Cycle Record(s) EOF	Messages from Ship 2
Data File N	File Header Record Series Header Record * Plain Language Record(s) Data Cycle Record(s) EOF	Messages from Ship N
Tape Terminator File	File Header Record (dummy entries) End of Tape Record EOF EOF	

4. DATA CYCLE DEFINITION RECORD
(insert trakob4 here)

5. ANNOTATED LISTINGS

5.1 SAMPLE TRACKOB REPORT - The following is the first of a fictitious series of reports of underway measurements taken by RRS Discovery in May 1987. The GF3 series header record for this series is illustrated in 5.2 while the data are stored as shown in 5.3

$M_iM_iM_jM_j$ YYMMJ

NNXX 10057

GGgg/$Q_cL_aL_aL_aL_a$ $L_oL_oL_oL_oL_o$ $4m_Tm_sm_ci_c$ $6s_nT_wT_wT_w$ 8S $S_o{\sim}S_oS_oS_o$ $(9d_od_oc_oc_o)$

0600/73832	00558	40910	60139	93103
0700/74832	00609		60139	93505
0800/74833	00621		60140	90207
0900/74835	00631		60140	90404
1000/74835	00645		60140	90905
etc. etc.	etc.		etc,	etc.
2100/74847	00811		60138	90503
2200/74847	00823		60138	90804
2300/74847	00835		60137	91103

D....D

GLNE

5.2 SAMPLE GF3 SERIES HEADER RECORD (first 400 bytes only) - for the series commencing with the sample TRACKOB report shown in 5.1. The last 1520 bytes of the record are not used and are blank filled.

5.3 ANNOTATED LISTING OF SAMPLE DATA CYCLE RECORD FORMATTED ACCORDING TO THE DEFINITION GIVEN IN SECTION 4

The record commences with the data contained in the sample TRACKOB report shown in 5.1.

6. GF3 PARAMETER CODES REFERENCED IN THIS SUBSET

6.1 MAPPING TRACKOB MESSAGE PARAMETERS TO GF3

CODE FORM: WHO FM 62-VIII Ext. TRACKOB - REPORT OF MARINE SURFACE OBSERVATION ALONG A SHIP'S TRACK

Note i) A TRACKOB report containing observations taken on the same date along a ship's track is identified by $M_iM_iM_jM_j$ (= NNXX) and the group YYMMJ, and followed by Section 2 repeated as often as observations are available for that day. The report is terminated by the ship's call sign D... .D. Each occurrence of Section 2 is mapped to a single GF3 cycle.

Note ii) Groups in brackets ( ) are optional - when they are not reported the corresponding GF3 parameter is set to its appropriate null value as specified by the dummy value code in the definition record).

Note iii) The GF3 parameters QPOS7AAN, FFFF7AAN are not obtained from the TRACKOB report but are quality control flags assigned during subsequent checking of the data.

TRACKOB group	Explanation of TRACKOB group (mapping of group into GF3)	GF3 parameter
$M_iM_iM_jM_j$	Report identifier= 'NNXX' for a TRACKOB report (it is suggested that the text 'TRACKOB' be included in bytes 39-50 of record 005 of the series header record so as to indicate that the data were supplied via a TRACKOB report)	
YYMMJ	i) J indicates last digit of the year (expanded to four digits and transcribed into . YEAR7ZTN	
	ii) MM is the month, YY is day of month, transcribed directly into DATE7ZTN	

GGgg/ GG is the hour of observation, gg is the minutes - both in GMT, transcribed directly into HHMM7ZTN

$Q_cL_aL_aL_aL_a$ Latitude in degrees and minutes in form DDMM with hemisphere indicated by Qc (converted to degrees to 3 decimal places; north +ve, south -ve: and transcribed into LATD7XXN

$L_oL_oL_oL_oL_o$ Longitude in degrees and minutes in form DDDMMwith east/west indicated by Q of the latitude group (converted to degrees to 3 decimal places, expressed in the range O to 360 degrees East, and transcribed into LOND7XXNN

$4m_Tm_sm_ci_c$ i) m_T - averaging period for sea temperature (WHO Code 2604) (transcribed directly into APER7XXN (SSTP7XXD)

ii) m_s - averaging period for salinity (WMO Code 2604) (transcribed directly into APER7XXN (SSSL7XXD)

iii) m_c - averaging period for surface current direction and speed (WMO Code 2604) (transcribed directly into APER7XXN (SCSP7XXD)

iv) i_c - units indicator for current speed (WMO Code 1804) -see group $9d_od_oc_oc_o$

v) In a TRACKOB report the group $4m_Tm_sm_ci_c$ is included only for the first observation (i.e., first occurrence of Section 2) and omitted for subsequent observations for which the averaging procedures are the same. The group is repeated as and when subsequent changes are made to these procedures.

$6s_nT_wT_wT_w$ Sea surface temperature in tenths of degrees Celsius; s_n gives the sign thus ‘0’ if +ve and ’1‘ if -ve (code s_n is changed to a sign and the signed value is transcribed in 0.1 deg C into SSTP7XXD

$8S_oS_oS_oS_o$ Surface salinity (practical) to hundredths (transcribed directly in units of 0.01 into . . SSSL7XXD

$9d_od_oc_oc_o$ Surface current direction and speed:

i) $c_i$od. - direction (relative to true North) toward which current flows in tens of degrees (transcribed directly in 10’s degrees in the range O to 360 degrees (i.e., O = north, 90 = east, 180 =south, 270= west) into SCDT7XXD

ii) c_oc_o is the surface current speed in 0.1 meters/second if i_C = 0, or 0.1 knots if i_C = 1 (converted to m/s if necessary and transcribed in 0.01 m/s into SCSP7XXD

iii) The group $(9d_od_oc_oc_o)$ is encoded as 90000 if the sea surface current speed is less than 0.05 m/s (0.1 knots)

D....D Ship’s call sign (transcribed directly into bytes 13-18 of record 002 of the series header record, prefixed by an entry of ‘1’ in byte 12- these bytes are left blank if D....D contains the word SHIP)

6.2 LIST OF GF3 PARAMETER CODES

PPPP KK MM s

APER 7 XX N AVERAGING PERIOD FOR MEASUREMENT (WMO Code 2604)

One character code defining the period over which a measurement was averaged - coded as in WMO Code Table 2604 as given below:

1 less than 15 minutes
2 from 15 to 45 minutes
3 more than 45 minutes
4-8 unassigned
9 data not available

DATE 7 ZT N DATE WITHIN YEAR IN FORMAT MMDD (GMT)
Where MM= calendar month and DD = day of month

FFFF 7 AA N QUALITY CONTROL FLAG
This indicates a quality control flag applicable to the value of the immediately preceding parameter in the 'user-defined area'.

Flag coded as in GF3 Code Table 6 thus:

Code Descriptor

blank unspecified or quality control check has not been made

A Acceptable: data found acceptable during quality control checks

S Suspect Value: data considered" suspect (but not replaced) by the data originator on the basis of either quality control checks or recorder/instrument/platform performance

Q Questionable Value: data considered suspect (but not replaced) during quality control checks by persons other than those responsible for its original collection e.g., a data centre

R Replaced Value: erroneous or missing data has been replaced by estimated or interpolated value - method by which replacement values have been derived should be described in plain language records

M Missing Value: original data erroneous or missing

HHMM 7 ZT N TIME WITHIN DAY IN FORMAT HHMM
Where HH = hours and MM = minutes
(The above 3 parameters relate to the date/time of measurements expressed in GMT)

LATD 7 XX N LATITUDE IN DEGREES (North +ve, South -ve)

LOND 7 XX N LONGITUDE IN DEGREES (East +ve, West -ve)

QPOS 7 AA N QUALITY CONTROL FLAG FOR GEOGRAPHIC POSITION
One character quality control flag applicable to the latitude and longitude recorded for a given geographic location - coded as for FFFF above

SCDT 7 XX D DIRECTION TO WHICH SEA SURFACE CURRENT IS FLOWING (degrees, relative to True North)

SCSP 7 XX D SEA SURFACE CURRENT SPEED (meters/second)

SSPS 7 XX D SEA SURFACE PRACTICAL SALINITY (-)

SSTP 7 XX D SEA SURFACE TEMPERATURE (degrees Celsius)

YEAR 7 ZT N CALENDAR YEAR

7. USER OPTIONS

There are no options for this subset.

WAVE HEIGHT-PERIOD DATA

1. INTRODUCTION

1.1 This subset is designed for time-series of wave height and wave period where these parameters are some form of statistical representation of the original wave records, e.g., characteristic wave height (4*RMS wave height) and peak period of the wave spectrum.

2. CHARACTERISTICS OF THE SUBSET

2.1 The data files are configured as multi-series data files as illustrated in Section 3.

2.1 Each data series contains a time-series of data from a given location ordered in ascending sequence of time. Within the series each data cycle contains date, time wave record duration, characteristic wave height, and peak period of the spectrum, together with the associated wind speed and direction parameters as defined by the definition record given in 4.1. Each of the wave and wind parameters is followed by a quality control flag.

2.3 Each data cycle record is designed to carry up to 46 data cycles - blank characters in the format specification permit a neat 80 column layout. Note that the year of observation is defined as a header parameter and is included once only in each data cycle record. If the year changes, then the data should be continued starting with a new data cycle record.

2.4 Wind data is only entered if available in close proximity to the wave measuring site - otherwise wind speed and direction are set to their null values. The geographic co-ordinates of the wind measuring site and the circumstances of the wind measurements (particularly anemometer height) should be included in the plain language records.

2.5 Null values are not specified for the parameters YEAR, DATE and HHMM - these fields are mandatory. The user formatted area of the series header record is not used in this subset and should be left blank.

2.6 Liberal use should be made of the plain language records following the file header or series header records, as appropriate, so as to ensure that the data are adequately described and documented.

2.7 A common method for analyzing wave records is by the Tucker-Draper method (see e.g., L. Draper (1966) - ‘The Analysis and Presentation of Wave Data - A Plea for Uniformity’, Proc 10th Coastal Engineering Conf., Tokyo, Vol. 1, pp. 1-1 1). An extended version of the basic subset has been developed to cater to data analyzed by this method - it can be used simply be replacing the data cycle definition record in 4.1 by that in 4,2. The format is virtually the same as that of the basic subset except that the data cycles contain 5 additional parameters and each data cycle record can only store up to 23 discrete data cycles.

3. TAPE STRUCTURE

3. RECORD SEQUENCE (with one series per data file)

Test File	Test Records EOF	* optional records
Tape Header File	Tape Header Record * Plain Language Record(s) Data Cycle Definition Record EOF	
Data File 1	File Header Record * Plain Language Record(s) Series Header Record * Plain Language Record(s) Data Cycle Record(s) Series Header Record * Plain Language Record(s) Data Cycle Record(s) etc. EOF	Location 1 Location 2
Data File 2	File Header Record * Plain Language Record(s) Series Header Record * Plain Language Record(s) Data Cycle Record(s) EOF EOF	Location 1
Tape Terminator File	File Header Record (dummy entries) End of Tape Record EOF EOF	

4. DEFINITION RECORDS

4.1 DATA CYCLE DEFINITION RECORD
(insert wave4.1)

4.2 DATA CYCLE DEFINITION RECORD (MODIFIED TO CATER FOR OUTPUT FROM TUCKER-DRAPER ANALYSIS)
(insert wave4.2)

5. ANNOTATED LISTING OF SAMPLE DATA CYCLE RECORD FORMATTED ACCORDING TO THE DEFINITION GIVEN IN 4.1

6. PARAMETER CODES REFERENCED IN THE SUBSET

PPPP K MM S

DATE 7 --N DATE WITHIN YEAR IN FORMAT MMDD

LE	Time of observation end (local time)
LS	Time of observation start (local time)
LT	Time of observation (local time)
ZE	Time of observation end (GMT)
ZS	Time of observation start (GMT)
ZT	Time of observation (GMT)

DRSC 7-- N DURATION (SECONDS)

PR	Duration of processed observation
SS	Duration of individual sample

FFFF 7-- N QUALITY CONTROL FLAG

Quality control flag applicable to the value of the immediately preceding parameter in the 'user-defined area'. It is coded as follows:

Code Descriptor

blank Unspecified or quality control check has not been made

A Acceptable: data found acceptable during quality control checks

S Suspect Value: data considered suspect (but not replaced) by the data originator on the basis of either quality control checks or recorder/instrument/platform performance

Q Questionable Value: data considered suspect (but not replaced) during quality control checks by persons other than those responsible for its original collection e.g., a data centre

R Replaced Value: erroneous or missing data has been replaced by estimated or interpolated value - method by which replacement-values have been derived should be described in plain language records

M Missing Value: original data erroneous or missing

HHMM 7-- N TIME WITHIN DAY IN FORMAT HHMM

LE	Time of observation end (local time)
LS	Time of observation start (local time)
LT	Time of observation (local time)
ZE	Time of observation end (GMT)
ZS	Time of observation start (GMT)
ZT	Time of observation (GMT)

VCAR 7-- D CHARACTERISTIC WAVE HEIGHT (4*RMS) (meters)

X-	Unspecified method of calculation
F-	Fourier transform calculation

L-	Lag correlation calculation
C-	Simple computer analysis calculation
M-	Manual analysis of chart
E-	Visual estimation
-X	Unspecified sensor
-U	Unspecified instrumented sensor
-A	Accelerometer
-B	Ship borne wave record
-E	Inverted echo sounder
-L	Laser altimeter
-P	Bottom mounted pressure device
-R	Satellite altimeter
-S	Staff gauge
-V	Visual

VMNL 7--D MINIMUM WAVE LEVEL (meters)

X-	Unspecified method of calculation
F-	Fourier transform calculation
L-	Lag correlation calculation
C-	Simple computer analysis calculation
M-	Manual analysis of chart
E-	Visual estimation
-X	Unspecified sensor
-U	Unspecified instrumented sensor
-A	Accelerometer
-B	Ship borne wave record”
-E	Inverted echo sounder
-L	Laser altimeter
-P	Bottom mounted pressure device
-R	Satellite altimeter
-S	Staff gauge
-V	Visual

VMXL 7--D MAXIMUM WAVE LEVEL (meters)

X-	Unspecified method of calculation
F-	Fourier transform calculation
L-	Lag correlation calculation
C-	Simple computer analysis calculation
M-	Manual analysis of chart
E-	Visual estimation
-x	Unspecified sensor
-u	Unspecified instrumented sensor
-A	Accelerometer
-B	Ship borne wave record
-E	Inverted echo sounder
-L	Laser altimeter
-P	Bottom mounted pressure device
-R	Satellite altimeter
-s	Staff gauge
-v	Visual

VTCA 7--D AVERAGE WAVE CREST PERIOD (seconds)

X-	Unspecified method of calculation
F-	Fourier transform calculation
L-	Lag correlation calculation
C-	Simple computer analysis calculation
M-	Manual analysis of chart
E-	Visual estimation
-X	Unspecified sensor
-U	Unspecified instrumented sensor
-A	Accelerometer
-B	Ship borne wave record
-E	Inverted echo sounder
-L	Laser altimeter
-P	Bottom mounted pressure device
-R	Satellite altimeter
-S	Staff gauge
-V	Visual

VTDH 7--D TUCKER DRAPER SIGNIFICANT WAVE HEIGHT (meters)

X-	Unspecified method of calculation
F-	Fourier transform calculation
L-	Lag correlation calculation
C-	Simple computer analysis calculation
M-	Manual analysis of chart
E-	Visual estimation
-X	Unspecified sensor
-U	Unspecified instrumented sensor
-A	Accelerometer
-B	Ship borne wave record
-E	Inverted echo sounder
-L	Laser altimeter
-P	Bottom mounted pressure device
-R	Satellite altimeter
-S	Staff gauge
-V	Visual

VTKC 7--D SECOND HIGHEST WAVE CREST (meters)

X-	Unspecified method of calculation
F-	Fourier transform calculation
L-	Lag correlation calculation
C-	Simple computer analysis calculation
M-	Manual analysis of chart
E-	Visual estimation
-X	Unspecified sensor
-U	Unspecified instrumented sensor
-A	Accelerometer
-B	Ship borne wave record
-E	Inverted echo sounder
-L	Laser altimeter
-P	Bottom mounted pressure device
-R	Satellite altimeter
-S	Staff gauge
- v	Visual

VTKD 7--D SECOND LOWEST WAVE TROUGH (meters)

X-	Unspecified method of calculation
F-	Fourier transform calculation
L-	Lag correlation calculation
C-	Simple computer analysis calculation
M-	Manual analysis of chart
E-	Visual estimation
-X	Unspecified sensor
-U	Unspecified instrumented sensor
-A	Accelerometer
-B	Ship borne wave record
-E	Inverted echo sounder
-L	Laser altimeter
-P	Bottom mounted pressure device
-R	Satellite altimeter
-S	Staff gauge
-V	Visual

VTPK 7--D WAVE SPECTRUM PEAK PERIOD (seconds)

X-	Unspecified method of calculation
F-	Fourier transform calculation
L-	Lag correlation calculation
C-	Simple computer analysis calculation
M-	Manual analysis of chart
E-	Visual estimation
-X	Unspecified sensor
-U	Unspecified instrumented sensor
-A	Accelerometer
-B	Ship borne wave record
-E	Inverted echo sounder
-L	Laser altimeter
-P	Bottom mounted pressure device
-R	Satellite altimeter
-S	Staff gauge
-V	Visual

VTZA 7--D AVERAGE ZERO CROSSING WAVE PERIOD (seconds)

x-	Unspecified method of calculation
F-	Fourier transform calculation
L-	Lag correlation calculation
C-	Simple computer analysis calculation
M-	Manual analysis of chart
E-	Visual estimation
-x	Unspecified sensor
-u	Unspecified instrumented sensor
-A	Accelerometer
-B	Ship borne wave record
-E	Inverted echo sounder
-L	Laser altimeter
-P	Bottom mounted pressure device
-R	Satellite altimeter
-s	Staff gauge
-v	Visual

WDIR 7 XX A DIRECTION FROM WHICH WIND IS BLOWING (degrees relative to True North)

WSPD 7 XX A HORIZONTAL WIND SPEED (m/s)

YEAR 7 --N CALENDAR YEAR

LE	Time of observation end (local time)
LS	Time of observation start (local time)
LT	Time of observation (local time)
ZE	'Time of observation end (GMT)
ZS	Time of observation start (GMT)
ZT	Time of observation (GMT)

7. USER OPTIONS

7.1 It is recognized that there are many different methods for analyzing a wave record e.g., height and period could be determined as the mean height and period of the highest one third waves (a list of such parameters and their definitions may be found in the GF3 Code Tables Manual).

The basic subset, as defined in 4.1, assumes that wave height is expressed as characteristic wave height (i.e., 4*RMS) and that wave period is expressed as the peak period of the wave spectrum. To accommodate other types of wave height and period the user simply modifies the parameter code given in columns 3-10 of records 008 and 010 of the data cycle definition record (i.e., VCAR7FXD and VTPK7FXD) and the respective parameter names given in columns 14-40.

For example, for a Tucker-Draper type analysis producing only significant wave height and mean zero crossing period (without the additional parameters given in the Extended Subset of 4.2) one could use the basic subset of 4.1 by simply replacing VCAR7FXD by VTDH7MBD and VTPK7FXD by VTZA7MBD and modifying the parameter name.

7.2 The example given above also illustrates the use of the method field in the parameter code (characters 6 and 7):-

FX - parameter derived by a Fourier analysis of a wave record obtained from an unspecified type of sensor.

MB - parameter derived by manual analysis of chart record obtained from a Ship borne wave recorder.

The user can select the appropriate method code from the list given in the GF3 Code Tables Manual. If the method codes vary within a tape or file they can be set to 'XX' i.e., unspecified, in which case the methods should be clearly identified in the plain language records.

7.3 Additional parameters may be added to the data cycles simply by adding to the end of the list of parameters in the data cycle definition record and by modifying the format specification in a similar fashion to that by which the Tucker-Draper Subset (in 4.2) was created out of the basic subset (in 4.1). Whenever possible the format specification should be designed so as to retain a neat 80 column layout in the data cycle record.

7.4 If the same data cycle definition record (including its method codes) is applicable to all data on the tape, then it need only be inserted once i.e., in the tape header file. If not, then an appropriate data cycle definition record should be inserted at the head of each data file instead of in the tape header file as shown in 3.

7.5 The grouping of data series into tiles is at the user's discretion. For example, he may wish to store only related data in the same file or alternatively, group all his data in one single file.